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TOWARD A THEORY OF LIBRARY AND INFORMATION SCIENCE

Indiana University PH.D. 1983

TOWARD A THEORY OF

LIBRARY AND INFORMATION SCIENCE

BY

ALVIN M. SCHRADER

Submitted to
the faculty of the Graduate School
in partial fulfillment of the requirements
for the degree Doctor of Philosophy
in the School of Library and
Information Science,
Indiana University

July, 1983

Accepted by the faculty of the Graduate School, Indiana University, in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the School of Library and Information Science.

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ABSTRACT

The present inquiry addresses the problem of an adequate definition of the domain of library and information science. Such a definition must be formulated according to the rigor of logic, for it is patent that mapping out a scholarly domain is more than an act of self-evident discovery. Discourse about a domain does not arrange itself in social reality; it must be rendered explicit. Concepts must be expressed as a system of linguistic terms.

Such a terminological system is a necessary condition for the development among a community of researchers and practitioners of a consensus on the fundamental problems posed in their inquiry and service activities. Without this consensus in the community, progress in conceptualization is impeded, and so knowledge cannot advance.

The present research applies logical and conceptual analysis to the task of defining the domain of library and information science. First, extant definitions are examined from the literature (in English, to 1981) and their diverse usage of terms is set forth. Basic concepts are identified and for each basic concept the synonymous terms are brought together. In this way a typology of generic definitions is developed. Then, the logical adequacy of each generic definition is considered.

The analysis reveals a profound depth of confusion, disagreement, contradiction, and inconsistency over the past 100 years about the proper characterization of the domain. More than 1,500 definitions of it are

documented here, and they contain over 340 synonymous, quasi-synonymous, and pseudo-synonymous terms purporting to capture its essence. Nowhere are the flawed claims more apparent than in the efforts to tease apart a domain of information science (itself only one among many fuzzy terms) from that of library science.

The dissertation then introduces the SIGGS metatheory, an extension of general system theory, as a way of enhancing domain conceptualization. In this enhancement, library and information science is taken to be a system of human social practice in which one person facilitates access to selected cultural objects on behalf of another person who is seeking access to them. The practice so characterized is the 'symbolic culture accessing system'.

The present work argues that this conception provides a more adequate and more powerful description of the domain than those definitions so far posited. As such, it constitutes a rudimentary descriptive theory of library and information science and so holds some promise of focusing the community's long-awaited consensus.

Accepted by Committee in Charge:

Bernard M. Fry, Chairman

Elizabeth Steiner, Director

Stephen P. Harter

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PREFACE

Some readers may judge my evaluation of colleagues' efforts to define library science and information science to be unnecessarily harsh and negative. It has not, however, been my intention either to show disrespect to previous scholars or to be demeaning to the stature of the discipline and its literature.

My interest has been inspired solely by a desire to advance our theoretical standing among the human sciences. In this endeavor, I have been guided by Toulmin (1972):

> *Each of us thinks his own thoughts; our concepts we share with our fellow-men.* For what we believe we are answerable as individuals; but the language in which our beliefs are articulated is public property. (p. 1)

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CHAPTER ONE

THE PROBLEM OF A CONSENSIBLE DEFINITION OF THE DOMAIN

1. Introduction to the Problem

Within the amorphous domain of what is described more and more frequently in the professional literature as 'library and information science', the search for definition, for consensible identity, has been pursued since at least the late 1800s by various communities of scholars and practitioners. The term 'consensible' is Ziman's (1968) neologism for signifying rational opinion about which there exists collective scholarly agreement; consensible knowledge is belief about the widest possible range of problems and uncertainties that is regarded as probable if not certain by the widest possible community of scholars (pp. 9-11).

This search for consensible identity in library and information science has not, however, been a concerted search effort. Rather, two disparate linguistic traditions have become formalized in the professional literature of this amorphous domain, and so the extant definitions have encouraged terminological and conceptual confusion instead of consensus.

The older linguistic tradition, 'library science' and its conceptual antecedents, emerged in Europe and the United States in response to the eighteenth century evolution of the notion of libraries as social institutions. Previously, they had functioned as the private property of political, religious, and cultural elites. In spite of this evolutionary awareness

of the social positioning of libraries, library science has been characterized by an almost exclusive focus on its institutional setting as a cultural archive. Recently, technological innovations, such as computerized access to bibliographic records and automation of library processes, have called into question the traditional focus of library science practice and research.

The later linguistic tradition, 'information science' (or 'informatics' in some parts of Europe and Asia) and its conceptual antecedents such as 'documentation' and 'information retrieval', developed in the early 1900s as the provision and study of universal subject access to the world's scientific and technical literature. The ultimate goal of this activity issued from the political and social philosophy of the founding fathers; they believed that enhanced human understanding would increase the prospects of international peace. By the 1930s, the solution to literature access problems had become conceived in narrowly technological terms. Microfilm, punched cards, and other reprographic innovations were the fashion of the times. Since the 1950s, the narrow technological focus has been reinforced by the rapid emergence of computerized systems of bibliographic control, of on-line bibliographic searching capability, and of electronic text access and dissemination.

The tradition of efforts in the definitional literature of information science and its antecedents to differentiate a domain of practice and research as separate and unique from the more established domain of library science has been a tradition of discontent and conceptual confusion. A rhetoric of labels rather than a logic of cognitive claims has prevailed. Information science and its antecedents have been hailed, variously, as more innovative, as more intellectual, as more scientific, and as more theoretical, than library science.

This legacy of discontent with the status quo has not resulted in a more heuristic scholarly consensus on the proper domain or domains of social practice and research. Rather, the chaos in terminology which has dominated efforts to tease apart the much-heralded new domain from the older library orientation has reflected a confusion in focus and in conceptualization. The conceptual structures of library science and information science are veiled in the shadows of linguistic disorder.

Thus, the long hoped-for precision in disciplinary scope, in research problems, and in professional practice--in short, in a consensible definition of the domain--has not been realized. The notions of library science and information science are not set forth adequately in the definitional literature. Technological innovations have not led to theoretical advance. Instead, two scholarly communities have emerged purporting to describe two worlds of social reality.

A few scholars have noted the inadequate state of consensible identity and have called for more rigorous theoretical formulations. The challenge was voiced early in the century by Henry (1917), who asked:

> Has librarianship found for itself or can it find a realm of opportunity, a phase, an area of human life that presents a social need which the professions named [law, medicine, clergy, education] and others that might be named do not cover? (p. 79)

Later, Butler (1933) described the nature of the problem in what has now become one of the few "citation classics" of the literature:

> Unlike his colleagues in other fields of social activity the librarian is strangely uninterested in the theoretical aspects of his profession. He seems to possess a unique immunity to that curiosity which elsewhere drives modern man to attempt, somehow, an orientation of his particular labors with the main stream of human life. The librarian apparently stands alone in the simplicity of his pragmatism: a rationalization of each immediate technical process by itself seems to satisfy his intellectual interest. Indeed, any endeavor to generalize these rationalizations into a professional philosophy appears to him not merely futile, but positively dangerous. (pp. xi-xii)

Reece (1936) urged:

> Before too much time has passed it may be desirable for librarians to attempt deliberate definition of their aims. Those among them may be right who press for a comprehensive statement of purpose or function which all may accept; or, if the terms seem more significant, for a philosophy or rationale. This would entail conclusions as to what libraries can achieve which other agencies cannot; what relation they should bear to the sciences and to organized knowledge; what their place should be in education, in recreation, in community life, and in the national economy; what responsibility they should undertake, and whether this is to be passive or aggressive. (p. 14)

Peirce (1951) concluded:

> Examination of the professional literature of the last twenty years [1930-1950] reveals a basic complaint repeated again and again by American writers. The complaint is that there is no philosophy of librarianship, no theoretic discipline on which the technical studies of the profession can be based. (p. 1)
> . . . .
> Dozens of papers have been written on the subject [of a philosophy of librarianship] and yet the profession as a whole has never found a reasoned statement that it could agree upon with anything like unanimity. (p. 3)

Egan, Focke, Shera, and Tauber (1956) observed:

> We have an awed sense that human civilization, in all its wonderful complexity, depends upon the ability to accumulate, to transmit, and to use in new contexts, all of human experience and knowledge. We know that the records of knowledge--the materials in our library collections--play a vital role in this process, but we have not been very successful in isolating the exact part of the process which is the unique function of the librarian.
>
> In short, we are still awaiting the formulation of a central theory of librarianship which will enable us to sort and organize effectively the knowledge of library operations which we already possess. (p. 65)

Shera (1963) said:

> The first responsibility of a profession is to know itself, which means, first, knowing what a profession is; second, knowing what kind of a profession it is; and third, knowing what differentiates it from all other professions. There is in every profession a quintessential element that distinguishes it from other human activities and which may derive from the intellectual content of its discipline, the technology of its practice, the responsibilities which society has placed upon it. It may be defined in terms of all or any combination of these. But librarianship, unfortunately, has been little given to professional introspection. (p. 162)

An editorial in the July, 1964 issue of *Library Journal* suggested:

> [Librarianship] is still in its semantical infancy. Rather than create new terms of our own, however, we are currently involved in wholesale borrowing from another discipline. . . .
> . . . .
> The latest infatuation is with the language of automatic data processing.
> . . . .
> As the new language moves into, or is taken into librarianship, and *information retrieval* replaces *reference service*, or *cataloging* and *classification* give way to some combination of *storage* and *programming*, standard terms are often lost, and with them a certain semantical maturity. Unfortunately, even with all its status advantages, the new language does not, not yet anyway, relate to what we are doing.
> Changing the labels does not change the contents. (p. 275)

Fairthorne (1965) argued:

> Inevitably, emerging activities breed ill-conceived words that at first obscure and obstruct rational action, the stubborn survivors remaining to plague students indefinitely. For terminology reflects theory, implicit or explicit, and no activity starts off with correct or even clear-cut theory. Also, because of impatience as well as slovenliness, terms are often ill-considered as well as ill-conceived.
> However, in our field, terminological corruption has gone well beyond what is inevitable into what is scandalous. Some, indeed, is deliberate exploitation of vogue words for money or prestige. . . .
> . . . .
> [Confused] terminology confuses both aim and effort. Those may travel the farthest who do not know where they are going, but they do not necessarily travel in the right direction. Some current targets may exist only as forms of words. (p. 9)

Baxendale (1966) wrote:

> It is clear that the illusory boundaries being drawn between documentalists and librarians are based not so much on differences in purpose and activity as on mutually unrecognized synonymies in language and in practices. This state of affairs has inhibited communication. It will be regrettable if artificial distinctions are frozen into the curricula currently being formulated by the universities. The reality is merely that nonconventional devices, such as the computer, have added a new dimension to documentation. They have introduced the system engineer into the library, and he is demanding keener insights, fresh approaches, and new skills of the library and documentation community. (p. 73)

Taylor (1966) also wrote:

> As one reviews the papers relevant to this topic [the professional aspects of information science and technology], it is apparent that not only is there a wide discrepancy in the usage of terms to describe personnel engaged in information science and technology, but also

> confusion as to the extent of the field. This confusion is a natural phenomenon in a developing field. (p. 16)

Harlow (1969) noted:

> There is today no single definition of "librarianship" with which all who are active in the field will agree. Within the range of possibility will be found such varied interests as accounting systems for book funds, the problems of dates in bibliographic citations, criteria for selecting and evaluating information, systems analysis, and the creation of computer input. Only in very limited areas has a theoretical or structural approach been made. And like other fields which have not yet "achieved a state of synthesis," the lack of a theoretical base tends to encourage practitioners (librarians and teachers) to accept tradition and practice because "some arbitrary status authority" has declared in favor of it. We are not now, therefore, in a position as educators to organize a curriculum around a stated body of theory or usage, nor can we afford to postpone change indefinitely while seeking a seemingly illusive consensus. (p. 78)

Fairthorne (1969), again, argued:

> [There] is urgent need for common agreement on some terminology in which the terms will have the same general meanings for preliminary discussion between different parts of Information Sciences, Technologies, and Activities [ISTA]. Current ambiguities, such as the various very different uses of 'Information Retrieval', to say nothing of 'Information', seriously obstruct joint discussion of matters to which more than one branch of ISTA can contribute.
>
> Common terminologies, even imprecise terminologies, can succeed only in so far as they stand for common ideas. (p. 29)

Shera (1970) observed:

> As for librarianship, there is no structure, no frame of reference, no real agreement about what librarianship is and what the librarian's professional responsibilities are against which the librarian's educational program can be measured. (p. 38)

Saracevic (1971) wrote:

> It cannot be said often enough that the fundamental difficulties of the field [information science, technology, and practice] as a whole can be traced to the failure to distinguish between science and technology, the fundamental problem thus is a lack of structure and specification of relationships. (p. 130)

Taylor (1971) declared:

> [I feel] that poverty of definition is one of the basic problems that librarianship or library science suffers from. . . . (p. 465)

Vagianos (1971) charged that information science was a "house built on sand" and declared:

> Most papers delivered at conferences or written about the subject information science begin with apologies for a lack of an operational definition, provide a personal definition, or demand that one leave "the slippery slopes of sterile semasiology" and get to the work at hand. This is not accidental. It occurs because intellectual statements of definition which have validity are not available. (p. 14)

Wasserman (1972) noted:

> In disciplines with strong intellectual components, it is within the academic centers that research and theoretical work are most assiduously prosecuted. But in librarianship the traditions of concept formulation, theory building, or basic study have been uncommon. (p. 138)

Wellisch (1972) observed:

> A unified and logically sound terminology, though not the only prerequisite, will be indispensable on the long road towards the emergence of a true science of information. (p. 179)

Brimelow (1974) wrote:

> The time has come to consider seriously the problem and terminology [of the librarian and information scientist] from a universal viewpoint rather than as a national, single discipline or introspective problem. (p. 168)

McGarry (1975) suggested:

> Perhaps an acceptable definition of librarianship might not be of much help even if it were obtainable. We need an explanation rather than a definition, a detailed account of the work the concept has to do, an idea of the meaning that the term librarianship evokes in others, and an idea of the territory it is supposed to cover. Having done this we might at least be able to say what librarianship is *not* which is just as important as being able to say what it is. In order to find out what something is we try to demarcate its area of application. . . . (p. 5)

Harris (1976) asserted:

> Librarians have for too long abnegated their responsibility to define their role in society. Lacking a clear sense of direction and a firm commitment to the preservation of human values, they have drifted from one "mission" to another. (p. 297)

Poole (1979) wrote:

> [The literature of information science] displays the existence of a continuing dispute over the definition and legitimacy of the field

> as a true "science". . . . [It] reflects clearly that the intellectual foundation of the field is threatened by the absence of basic, supporting theory while simultaneously indicating (by the paucity of literature on the topic) that theoretical research and theory development have not been major field activities. (p. 1)

White (1981), in an article entitled "We do, do, do, and don't know why", argued:

> As a profession we have been strangely disinterested in examining and perhaps re-validating our premises. One can guess why this is true; it is a general management observation that consideration of fundamental change is slow to come when the process is controlled by individuals involved in detailed practice. (p. 317)

In a survey of library school students, Richardson and Hernon (1981) discovered that:

> [Library school students'] definitions were general, which may be a function of their present level of comprehension or the imprecision in the literature. Only one student remarked that no good definition existed. Perhaps definitions merit closer scrutiny especially when, as students or librarians, they interact with people outside the professions. (p. 296)

Fry (1981) pointed out:

> Over the past fifty years document librarians have evolved efficient systems of practice, but they have failed to formulate a corresponding system of theory to guide, justify and control that practice. There has been neglect of theory which would provide a setting to which document handling practice could be related and against which the effectiveness and efficiency of that practice might be measured. (p. 1)
> . . . .
> Theory followed practice instead of leading it. (p. 2)
> . . . .
> The central question for librarians, information managers and other gatekeepers is not whether libraries will wither in the face of electronic alternatives, but whether we will recognize and act upon our professional opportunities to meet the public need. To this end consensus on a sound theoretical base is essential. (p. 7)

Finally, in what is the most frequently cited admonition to theoreticians of the domain, Fairthorne (1967) wrote:

> Any discipline must define its scope. That is, it must define what matters it will study explicitly.
> . . . .
> To begin with, the scope must include all those, but only those, phenomena that are essential to the nature of the study. (p. 711)

Responses to these calls for more adequate definition of the domain, for more adequate conceptualization, have followed a variety of methodological procedures. These methodologies can be grouped into two major categories: empirical definitions, based on inductive analysis; and conceptual definitions, based on logical content analysis.

2. Methodology to Solve the Problem

2.1. Empirical Definition of the Domain

Empirical approaches to defining the domain are of diverse natures. Most have consisted of attempts to infer general notions and general statements from what the researcher took to be observation of raw experience or of instances. In these definitional formulations, observation of raw experience was considered to be self-evident: a few instances are set forth as though equivalent to the whole; or instances are aggregated and claimed to represent the whole.

The literature following one or more empirical approaches has focused on: statements of library philosophy, library objectives, or library functions; job or task analysis; enumerations of professional competencies; listings of essential professional qualities; surveys of educational curricula; collections of key papers and bibliographies; listings of journal titles; and bibliometric studies of publication and citation patterns.

Illustrations of these approaches are presented here. In one situation, reported by Taylor (1966), a study team charged with surveying science information manpower concluded that, since extant definitions were incomplete, they would solicit the views of survey respondents in order

to fashion a more acceptable one. However, as Taylor correctly and succinctly observed:

> It should be noted that the choice of survey respondents itself is an act of definition. (p. 17)

Another situation in which the inadequacy of the empirical approach is evident was the survey of graduate level educational programs in information science that was undertaken by the American Society for Information Science for the early 1970s. This survey was criticized by Jahoda (1973):

> The [survey] directory points to the diversity of information science programs now in existence; it may also reveal some problems of collecting information about these programs by means of a questionnaire. Department affiliations of information science are variously described as business administration, computer science, communication, educational media, electrical engineering, industrial engineering, information science, library science, medical librarianship, and science information.
> . . . .
> There are three information science "programs" described in which only a single course in information science is offered. . . .
> . . . .
> The statement of employment preparation for graduates of the information science program also provides food for thought. Positions listed include librarian, programmer-analyst, software developer, systems programmer, numerical analyst, computer systems designer, and--perhaps most interesting of all--"specialist positions such as input, processing and storage" . . . (which almost sounds as though this particular school is building computers rather than preparing information scientists).
> One can conclude from this directory that information science means different things to different people. . . . (p. 323)

This survey was merely the most comprehensive in a long line of such studies which commenced with the flawed survey by Isabella (1963), in which the terms 'science information' and 'information science' were used as synonyms.

A number of recent bibliometric studies further illustrate the inadequacy of empirical approaches to domain definition. One example is the citation analysis reported by Small (1981). In this work, a core set of information science journals was selected by the researcher in the following way:

> The procedure used to select information science [co-citation] clusters . . . was to define a set of information science journals which appear as source journals in *SSCI* [*Social Sciences Citation Index*]. Fifty journals were selected. . . .
> . . . .
> [This] should not be regarded as a definitive list of journals in the field, but rather as one way of defining the field, which is subject to an empirical test later in our analysis. It should be noted, for example, that computer science journals were intentionally not included in the list, and that we were slanting the list toward the library/information science direction. (pp. 41-42)

This approach is logically and conceptually inadequate, because empirical corroboration after the fact is not possible. Empirical corroboration is statistical argumentation, not a determination of whether the original selection decisions adequately represent reality. The rationale for selecting instances of a phenomenon must precede the selection activity; theory comes before observation. As Neeley (1981) pointed out:

> A fundamental methodological question [in bibliometric studies] is the choice of publications . . . for not only do these materials provide the data to be analyzed, they also serve as the operational definition of the discipline they represent. (p. 218)

Such empirical approaches are particularly dangerous because the flawed conceptualizations are hidden beneath the powerful cloaks of science and computers.

Embedded in these empirical approaches to defining the domain is the assumption that concepts are atheoretical, that they emerge through inductive inference rather than by explicit formulation and critical analysis. A particularly extreme instance of this fallacy is the following argument by Hollnagel (1980):

> The nature of the natural sciences is such that they cannot allow the possibility of more than one interpretation of a set of observations, and this of course is reflected in their terminology and methodology.
>
> In contrast to this the behavioral sciences deal with phenomena which are directly observable and which have a prior description in natural language. In particular the phenomena may be observable

> to the individual person through his experience of them, e.g. through introspection or a phenomenological analysis. This means that we have a kind of privileged access to them . . . and hence that we *know* what we are talking about without having to define it rigorously first.
> . . . .
> If doubt ever begins to enter the conversation, we always have recourse to the base of primary experience.
> . . . .
> [The] fact that people, at least roughly, can agree on what information science is about without the definitions, or even disagree about the definitions, is further proof of the important role of the first-hand experience of the phenomena and what they are about. (p. 184)

Such a view of the logic of inquiry is seriously incomplete. The fundamental question ignored by such empiricism is this: From whence comes the selection of raw experience to observe? Why precisely this raw experience, and not that one? As Popper (1963) has argued:

> Observation is always selective. It needs a chosen object, a definite task, an interest, a point of view, a problem. And its description presupposes a descriptive language, with property words; it presupposes similarity and classification, which in its turn presupposes interests, points of view, and problems. (p. 46)

A humorous version of philosophical criticism of empiricism is found in Vanby's (1963) "a minor devil's documentation dictionary", in which he provides the following definition of the term 'documentation':

> n., Undefinable. It seems to consist of the logical sum of the professional activities of about 500 people. (p. 143)

Empirical definitions of a domain are at best partial reflections of reality. What is missing is formal evaluation of the adequacy of the cognitive claim. Klempner (1969) cautioned:

> [It] is essential for all to reconsider the fundamental notions inherent in the definition of our occupational field. Discussions relating to curricula development, course identification, and similar topics will lead nowhere unless we can first delimit and define the basic boundaries and segments of our field. (p. 335)

Similarly, empirical definitions which take the domain to be isomorphic with claims of professional competencies, professional qualities,

institutional objectives, institutional philosophies, or institutional functions are incomplete. In these, intention is equated to actuality. However, as Shera (1976) argued:

> We have sought a certain synthesis . . . in our insistence that librarianship is a profession, in a rather naive belief that a term, a simple noun, can give common attributes to an activity that will substitute for a theoretical frame of reference. We argue that, because we are a profession, we must, therefore, be a cohesive whole acting in certain socially beneficial ways. Thus we reject *this* because it is unprofessional, and accept *that* because it seems to fit the definition of the term set forth more than a half-century ago by Abraham Flexner. A name, or term, is no more than a form of definition for the possession of certain attributes and does not endow those attributes where they do not exist. (p. 282)

Thus, raw empiricism must give way to logical and conceptual analysis, to theoretical inquiry, so that domain definitions can be evaluated and then refined and extended according to the norms of consensible knowledge.

2.2. Conceptual Definition of the Domain

The human being exists in a universe of symbols which represent and express our concepts of reality. Since reality is a social construction, our ideas about the world must be formed. They must be formed by the human mind and by human minds in interaction. Cognitive claims must be constructed. Ideas, that is, concepts, must be expressed as a system of linguistic terms. These terms must be defined.

Thus, techniques of logical and conceptual analysis are required. That is to say, if the act of forming ideas is to be judged adequate, rules for concept-formation must be introduced. These rules are the rules of logic, encompassing the three dimensions of linguistic order: syntactics, semantics, and pragmatics. Steiner (1978) argued that:

> Logic sets forth not only syntactics but semantics as well, and both syntactics and semantics in terms of pragmatics.

> It follows from my broad conception of logic that logical analysis encompasses conceptual analysis. (p. 10)

The logical analysis of the content of a definition, then, is the a priori method of examining and rendering explicit the use of linguistic terms, so that the principle governing each use is revealed. What is sought is a one-to-one correspondence between the meaning of a concept and the term expressing it. To define is to stipulate meaning, to refer to this value and not that one.

When a concept is adequately formed as a substantive term, it takes the shape of a descriptive definition. Essential features are specified which set forth both necessary and sufficient conditions for the proper use of the term. A descriptive definition is an abbreviatory statement setting forth equivalence relations. These equivalence relations specify the conditions under which fewer terms may be substituted for more terms. A definition, then, is a kind of substitution rule. As Steiner (1978) wrote:

> Under this view, the descriptive definition becomes an abbreviatory one which states a rule for substituting fewer terms for more terms. Rules are stipulations (demands for agreement) which are conventions (agreements). Thus, any definition can be viewed as stipulative and conventional. However, this does not make a definition arbitrary. Abbreviatory definitions must have significance and they only have such when they correspond to a significant descriptive [rule]. . . . (p. 42)

The logical equation for expressing this substitution rule is the following: 'definiendum $=_{df}$ definiens'. In this expression, 'definiendum' stands for the defined term, 'definiens' stands for the defining terms, and '$=_{df}$' stands for stipulated equivalence. Polanyi (1958) expressed the logic of definition this way:

> [Definition] is a formalization of meaning which reduces its informal elements and partly replaces them by a formal operation (the reference to the definiens). This formalization will be incomplete also in the sense that the definiens can be understood only by those conversant with the definiendum. Even so, the

> definition may still throw new light on the definiendum, in the way a guiding maxim illuminates the practice of an art, though its application must rely on the practical knowledge of the art. Such definitions (like 'causation is necessary succession', 'life is continuous adaptation') are, if true and new, analytic discoveries. Such discoveries are among the most important tasks of philosophy. (p. 115)

To set forth a definition is to characterize something by marking off its similarities to and its differences from other linguistic terms. These similarity and difference relations must constitute exclusive classes of a general idea which are at the same time exhaustive of the possible partitionings of the idea. In other words, counter-instances and residual or junk classes are ruled out when a concept is adequately defined. Steiner (1978) wrote:

> To generate classes which exhaust the universal set, the basis for partitioning must be comprehensive enough. Its scope must be that of the universe of discourse. (p. 36)

Since the activity of logical content analysis is that of evaluating cognitive claims, and the activity of definition is that of constructing cognitive claims, rudimentary descriptive theorizing is being characterized. The standard of judgment is not raw sensory observation, as the proponents of empirical definition maintain; but rather, it is the adequacy of reasoning. Concepts must be fixed and this is accomplished through the technique of logical and conceptual analysis, or logical content analysis, or, simply, logical analysis. As Steiner (1981) observed, "definition is an affair of reason" (p. 49).

3. Objectives of the Present Inquiry

The present inquiry addresses the problem of an adequate definition of the domain of library and information science. Its objectives are to make available in one document every identifiable definition in the published

literature, and to assist in promoting and in achieving greater precision and clarity of domain conceptualization.

The following questions are posed for the inquiry. First, what definitions have appeared in the professional literature over the past 100 years or so of the terms 'library science', 'information science', of their conceptual antecedents, and of their conjunctions? Second, can any one of these extant definitions be considered adequate and, in particular, does any one of them provide a logical distinction between the two primary terms? If none meets this condition, what would constitute a more adequate definition for the domain of problems of interest here? Perhaps even more ambitious, what would constitute an adequate term for describing this domain?

An adequate definition of the domain must be formulated according to the rigor of logic, for it is patent that mapping out a scholarly domain is more than an act of self-evident discovery. Discourse about a domain does not arrange itself in social reality; it must be rendered explicit. Concepts must be expressed as a system of linguistic terms. Thus, to describe a domain is to know its linguistic expression. This expression encompasses at the core of the domain all definitions which are signified by the following terms: universe of discourse, universal set, discipline, field, subject matter, study, province, provenance, sphere, realm, territory, scope, basis, foundation, boundary, identity, structure, conceptual framework, nature, philosophy, and function or functioning. All of these are taken in the definitional literature to be synonymous terms.

Since the problem of this dissertation inquiry, to define the domain of library and information science, is a problem of theory, philosophical research is required. This takes the form of logical and conceptual analysis,

as outlined in the previous section. First, extant definitions are examined from the professional literature (in English, to 1981 inclusive) and their diverse usage of terms is set forth. Because the objective of this inquiry is to identify linguistic commonality, literature that is focused narrowly on type of library is excluded; institutional theories, for example, a theory of academic librarianship, tend to emphasize the institutional setting and to disregard the larger disciplinary connection.

After the meaning of each definitional expression has been stipulated, that is, after the diverse usage of terms has been set forth, basic concepts are identified and for each basic concept one or more key terms and their synonyms are brought together. In this way a typology of generic definitions is developed. Each generic definition and its synonymous expressions constitute a class or set. Then, the logical adequacy of each generic grouping is considered.

The second phase in the logical and conceptual analysis of the present work is to introduce the SIGGS metatheory, an extension of general systems theory, as a way of enhancing domain conceptualization. In this enhancement, library and information science is taken to be a system of human social practice in which two complementary functional roles are characterized. These are the functioning of the librarian or information specialist and the functioning of the user. Definitional rigor of this system of functionings is the goal.

The notion of function or functioning as the principle focus in logical analysis is not novel. From a philosophical point of view, the function of an endeavor determines the form and content of the endeavor. Steiner (1981) argued:

> There is deliberateness in human action, and so doing is structured, given form and content, in terms of an outcome, a function. (p. 58)

In the professional literature of library and information science, a number of writers have focused on the notion of function as a defining principle. Shera (1956), for instance, wrote:

> Librarianship is to be defined by the role that the librarian plays in society, and the boundaries of that role are to be discovered partly by recourse to the professional associations and the work they are doing and partly by a more thorough examination of the professional activities of librarians themselves. Of importance also is an understanding of those situations in which the librarian is making a major contribution to the work of his organization, be it a business, an academic institution, or a governmental agency. (p. 308)

Similarly, Egan (1956) observed:

> The long-continued demands of the library profession for "scholarship," "intellectual content," a "philosophy" or a "theory" sometimes have rather a hollow sound. A study of the profession and its rise among other somewhat similar groups should serve two purposes--it should separate "status" aspirations from truly professional requirements, and it should define exactly what the function of the profession is in relation to society at large, a question which has not been satisfactorily settled among librarians themselves. (p. 522)

Christ (1969) noted:

> The specific difficulty which library science realises in maximizing its utilization of the functional method of analysis pertains to the purpose or end of the library. Such a question is basically a philosophical consideration. Library science, however, has not developed a clear, well-defined philosophical base. (p. 245)

Vickery (1973) wrote:

> The whole world is itself a set of interacting entities and processes. The first step in any investigation is *system definition*--to define a subset that is to be investigated. Systems that include or are designed by people may be defined according to their ostensible function. An information transfer system is a set of components whose function is to transfer certain information between certain points. Both the general function (information transfer) and the specific limitations (what information is transferred from and to where) must be defined. (pp. 22-23)

Brimelow (1974) suggested:

> If [informatics] is an applied field then we must restrict it in some way by delimiting the field of application. (p. 167)

Wilson (1979) argued:

> One of the enduring problems in the library profession is that of defining what a librarian is. The many tasks performed by librarians have been analyzed, listed, explained, and explained again. Still, it has not been possible to assemble these tasks into a cogent explanatory whole, into a role that would be recognized by anyone as signifying "librarian." (p. 146)

Paisley (1980) also argued for a functional approach, in his conceptualization of information work:

> *Information tasks* are more generic than each type of work that includes them. They are common denominators in the work of scientists, professionals, managers, technicians, and even service workers and production workers. (p. 119)

This approach is logically inadequate, however, because it focuses on similarities and suppresses differences between types of work. Common denominators do not provide sufficient criteria for defining, but rather only necessary criteria. The terms of a definition must specify essential differences as well as essential resemblances. To class scientists and so forth as information workers because their work includes information is no more plausible than to class them as linguists because their work includes signs and symbols, or as mathematicians because their work includes numbers.

The most recent and most elaborate functional approach to occupational definition is found in the study by Debons, King, Mansfield, and Shirey (1981). They attempted to develop a functional definition of the notion of an 'information professional', in order to guide their large-scale manpower survey. The characterization which they developed, however, cannot be considered conceptually adequate. None of the terms used in the definition of an information professional were elaborated, and so all the terms appeared to be primitive ones. The result of such an approach is conceptual circularity and conceptual imprecision. Their

definition stated that information professionals are "involved in data and information work on behalf of others" (p. 4). However, the notions of 'involvement' and 'on behalf of' are not self-evident and, as a consequence, lack the precision required for guiding and sorting out those activities included in the domain from excluded ones. Adequate principles for classifying instances into functions are missing from this work.

In spite of their weaknesses, these illustrations from the definitional literature do point the way to a more rigorous conceptualizing of the domain of interest to the present inquiry. Analysis of social function is the key to domain characterization. Thus, in the present work, the typology of generic definitions which is developed may be taken as ultimately reducible to a typology of generic functions purporting to describe the domain of library and information science.

Other linguistic entities also serve as classificatory principles. These linguistic entities are the following: the name used to designate the domain; the nature or kind of domain; the content of the domain; and the focus of the domain. Domain names constitute the first sort among linguistic terms in the definitional literature. The second distinction relates to the nature or kind of domain, for example, whether the domain is taken to be a study, a science, a practice, an art, a technology, or some combination thereof. The third distinction among linguistic entities concerns the various terms used to describe the content of the domain, for example, whether the domain treats of knowledge, recorded knowledge, information, recorded information, books, documents, graphic records, recorded discourse, recorded symbols, or some combination thereof. The fourth distinction among definitional terms relates to the focus of the domain, that is, whether the domain is taken to serve objects,

persons, or both objects and persons; the notion of 'objects' encompasses physical and immaterial entities.

These distinctions among definitions--names, nature, content, focus, and function--are followed throughout the present research. To illustrate, a definition that takes library science to be 'the management of collections' is: first, a definition about the term 'library science'; second, a definition about the object 'collections'; and third, a definition about the function 'to manage'. A definition that takes information science to be 'information counselling' is: first, a definition about the term 'information science'; second, a definition about the object 'information'; and third, a definition about the function 'to counsel'.

Thus, the second and third chapters of the dissertation set forth the different senses of library science and of information science, respectively, as presented in the literature. Chapter Four sets forth extant conjunctions of library science and information science. Chapter Five constructs an enhanced conceptualization of the domain by introducing the SIGGS metatheory. The final chapter summarizes the present work and suggests directions for future inquiry.

It should be noted that not all the definitions included here were intended to constitute formal definitions, nor were the papers in which they appeared intended to constitute formal theoretical or philosophical research. However, following Kroeber and Kluckhohn (1952) in their approach to the analysis and evaluation of definitions of culture, the objective of this dissertation invites a similar approach to the analysis and evaluation of definitions of library science and information science. They wrote:

> We have tried to categorize on the basis of principal emphasis rather than by, as it were, averaging the total content of the definition. . . .
> . . . .
> Yet this does not mean that a given emphasis is constant for a particular author throughout his professional life. Indeed we present examples of definitions from the same publication which differ importantly in emphasis. The fact of the matter is that many of the definitions we cite are only very crudely comparable. . . .
> . . . .
> Some were hardly intended as formal definitions at all but rather as convenient encapsulations of what was taken as generally agreed upon. Nevertheless, it seemed important to us to document fully the range and variety of nuclear ideas and their possible combinations. We hope the reader will remember that we do not take our classification at all insistently in its details, and that we consider it useful for heuristic purposes only.
>
> The objective of our taxonomy is to illustrate developments of the concept [culture] and to bring out the convergences and divergences in various definitions. In our classification and our critical comments we realize that we are taking brief statements out of the larger context of the author's thinking. But our purpose is not to make an over-all critique of certain writers. It is rather to point up the important and useful angles from which the central idea has been approached. (pp. 77-78)

4. Contribution of the Present Inquiry

Since defining is rudimentary descriptive theorizing, a definition is a rudimentary descriptive theory. A more adequate definition of the domain of library and information science would be a contribution to theoretical understanding and so to consensible identity among scholars and practitioners. The enhancement of theory is the augmentation of the fund of human intelligence, and so of rational behavior.

Without this consensible identity, progress in conceptualization is impeded, and so knowledge cannot advance. Knowledge begins with rudimentary theorizing in which concepts are expressed as a system of linguistic terms. Such a terminological system is a necessary condition for the development of a consensus on the fundamental problems posed by inquiry and service activities within a domain. Thus, the definition of a

domain, the specification of consensible identity, constitutes a theoretical framework for thinking about the domain and for extending knowledge about it. Shands (1967) expressed it this way:

> The meaning of meaning is consensus, and the birth of meaning is in the social process allowing consensus to develop. Human communicational methods differ from those of all other animals in their artificiality, based upon the abstraction of pattern in naming, and thus by the necessarily shared meaning of the tokens used. (p. 104)

Moreover, to know is to be able to do, and thus adequate domain definition of human social actions is significant for a variety of operational realities. There are curriculum implications, organizational and institutional implications, occupational implications, and social implications. Domain definition tells what to teach and at what level, in what type of institution and by whom, what work and service can be expected, and how the public can determine appropriate expertise for sought help.

Since defining is rudimentary theorizing, the objective of the present inquiry is to contribute "toward a theory of library and information science" and so to facilitate the focusing of the community's long-awaited definitional consensus.

CHAPTER TWO

DEFINITIONS OF LIBRARY SCIENCE

1. The Published Literature

1.1. Overview

A search of the literature of library science for definitions of its domain and nature is tediously difficult for several reasons. The first is that bibliographic control for identifying the theoretical literature is entirely inadequate. In *Library Literature*, the headings 'terminology' and 'librarianship--philosophical aspects' are used, but not 'theory', 'science', 'discipline', or 'domain'; and in *Library and Information Science Abstracts* and its predecessor, there is a somewhat similar pattern. The second reason is that much of the theoretical work is restricted to the narrow type-of-library focus; theories of academic librarianship abound, for instance. Another reason is that the review literature has largely ignored theoretical work; *Advances in Librarianship* contained no major review article during its first decade of publication, 1970-1980. A fourth reason is that there are no "key paper" collections comparable to those which have been published in information science (see Chapter Three). Of the available anthologies, only McCrimmon's (1975) *American Library Philosophy* contains a few scholarly, that is, referenced, articles. A further reason is that the theoretical work on the domain of library science is sparse, sporadic, and of uneven quality; only one relevant

doctoral dissertation has been produced (Bryson, 1970), and there are few published contributions (a monograph by Christ (1972) and a journal article by Rawski (1973) are notable though incomplete). In the journal literature, the following reviews of early definitions are useful: Danton (1934), Grasberger (1954), Winger (1961), Khurshid (1976), and Rovelstad (1977); Molnar (1968) provides insight into recent East European developments. A master's thesis by Peirce (1951) gave a cursory summary of a selection of the early literature, 1930 to 1950, of the philosophy of librarianship.

1.2. Definitions

The published literature attempts to define the domain of library science in a variety of ways, ranging from descriptions of a librarian and of a library to a focus on criteria for professionalism to formal definitions of the field of study.

Although some 376 definitions and quasi-definitions of library science are examined here from the English-language press between 1650 and 1981, only a handful of them permit rigorous analysis. The others lack clarity and precision in the ideas they attempt to express. Thus it is that in the definition of the domain and essence of library science, there is no sense of conceptual evolution, no sense of an emerging enrichment of identity; rather, the sense is of conceptual inertia.

This conceptual inertia may be seen to derive from at least four problems in the literature that tries to define library science: abuse of metaphor; conflation of axiological and empirical ideas; parochialism; and, disregard for previously published work. With respect to the abuse of metaphor in this literature, the typical error is the anthropomorphized

library. In these descriptions, the library was invested with human attributes and behaviors; the most extreme cases treated it as a living organism. Illustrations of this error abound: "the purpose of the library is to inform and to educate"; "the library communicates knowledge and preserves the racial memory"; "the library selects, acquires, catalogs, circulates, and makes available books and other information"; "the library feeds man's mind with information"; "the library must have a missionary zeal for informal education"; "the library is the heart of the university"; "the library's obligation to its community is the preservation of democracy". The notion of the "library spirit," or "library faith" as it was also called, is an abuse of metaphor as well. These metaphorical usages are purely literary devices and ideological slogans, and as such have little if any heuristic value for scholarly discourse purporting to describe social reality.

Moreover, treatment of the librarian and the library as interchangeable concepts has not only obscured but has prevented the clarification of intended meaning. Clearly, this treatment leads to circularity of definition. The following conclusion by Colson (1980) illustrates the difficulty:

> [The] librarian is not uniquely identified by the nature of the work done. Rather, at the root of the matter, the librarian is identified by the name of the agency in which the work is done. The work of the librarian is not necessarily identifiable as such. (p. 96)

It is conceptually inadequate to take human beings as identical and interchangeable with the inanimate instrumental settings in which human intentionality and human actions are unfolded. People and places must be described separately. MacLeish (1940) made a similar observation in writing of the librarian's confused identity:

> Nothing is more difficult for the beginning librarian than to discover in what profession he is engaged. Certain professions define themselves. Others are defined by those who practise them. The

> librarian's profession is of neither nature. A librarian is so called not for what he does, as the farmer who farms or the lawyer who laws [*sic*], but from the place in which he does it. And the definitions of the librarians, though they are eloquent in describing the librarian's perfections, are reticent in saying what the librarian's perfections are for. (p. 13)

The second problem contributing to conceptual inertia in the definitional literature of library science is the conflation of axiological and empirical ideas. In these descriptions, value statements, which are assertions of what ought to be, are fused with scientific statements, which are assertions of what empirical phenomena are like. Ideals about reality thus become confused with factual ideas about reality; the metaphysical and the physical are indistinguishable. Whitenack (1963), for instance, asserted that "libraries, as always, will be citadels of knowledge where man may explore the alternatives in making choices" (p. 15). Similarly, Johnson (1970) confused axiological and empirical notions in the following claims:

> A written record, on reasonably durable material can immortalize the ideas or actions of a given generation, but only if those records are organized and preserved in library form will they seriously affect the development of generations to come. (p. 18)
> . . . .
> [The fullest purpose of the library is] making the heritage of the past fully available to all the people all the time. (p. 494)
> . . . .
> The role of the library as an adjunct to education, as a device for information, as a partner to education, as a boon for business, or as an assistant to science, has been widely acclaimed and to a large extent realized. As western civilization has reached what we like to think is its highest point, the library has come into its own as a key part of that civilization. We still do not have all the libraries and all the books that are needed, but we realize that our culture would not and could not have reached its present level without those libraries that we consider still inadequate. (pp. 496-497)

Much of the literature treating the philosophy of library science has suffered from this epistemological conflation of values and facts. In a similar vein, logical and empirical confusion abounds. McGarry (1975), for instance, asserted that:

> When we talk, someone must listen; when we write, someone must read; *communication is a social act.* (p. 19)

The third problem contributing to conceptual inertia in the definitional literature of library science arises from its deep-seated parochialism of scope. An "American library science" or a "British library science" or a "Russian library science" is neither a science nor a domain. Human functioning eschews geography, or at the very least requires a universal context in which to place particular manifestations of geographic idiosyncrasy.

The fourth problem in the literature is the disregard for previously published work. Generally, authors have not acknowledged any antecedent definitions of library science. In some cases, one or two definitions are noted but not their sources. In a very few instances, both definitions and sources are given. Conceptual analysis of these definitions is rare, and is disregarded by later authors in any event. The definitional literature does not build on past efforts; each new scholar defines library science *ex cathedra* and *de novo*.

These four major problems in the definitional literature of library science are root sources of the conceptual inertia and conceptual dissension that mark every elemental aspect of the domain: its nature, its scope of objects and subjects, its functions, and its focus relative to objects and subjects. With respect to the nature of the domain, is it, among other possibilities, a study, a science, an art, a social practice, a technical skill, or a combination of some of these? Does its scope encompass, among other possible objects, libraries, library collections, books, documents, publications, graphic records, subject literatures, scientific and literary materials, reading, knowledge, recorded knowledge, intellectual resources in all physical forms, culture, recorded culture, information, recorded

information, communication, or recorded communication? Many definitions use these terms interchangeably, as though a singular concept were being treated. It is patent, however, that the terms are not merely synonyms, but rather that they express diverse and distinct notions. Culture, for example, is broader than recorded culture; knowledge is broader than recorded knowledge; libraries are not coterminous with books; reading is a subset of recorded culture, and so forth.

With respect to the designation of subjects, if any, are they to be taken as scholars, students, readers, the reading public, citizens, inquirers, consumers, users, patrons, the community, or some combination of these possibilities?

Similarly, are the functions of librarians, among other possible objectives, to make accessible, to provide access, to manage, to keep, to preserve, to research, to study, to teach, to mediate, to advise, to advocate, to counsel, to promote, to supply, to retrieve, to interpret, to facilitate, to transmit, to transfer, to elevate, to connect, to link, to disseminate, to distribute, to inform, to enlighten, to inculcate, to guide, to regulate, to control, or to police? And are these functions focused on the domain's objects, on its subjects, or on both?

In each of these elemental aspects of the domain, there are overlapping--though not necessarily identical--concepts set forth in the literature. The definitional challenge in library science is to mark off the unique properties of each of these and other relevant concepts, and so to devise a more adequate conception of the domain.

2. The Name of the Domain

Although Dury (1650) in England and Cotton des Houssayes (1780) in France wrote about the functions of librarians, the term 'library science' is attributed to Schrettinger who in 1808 conceived of a scientific study for the practical organization of a library (Grasberger, 1954, pp. 392-393 and Rovelstad, 1977, pp. 10-11). Use of the term 'librarianship' by Todd in 1818 is noted in the *Oxford English Dictionary* (1933) (*OED*), signifying 'the office or work of a librarian', a merely circular usage since the office or work was not elaborated. The earliest appearances of 'library economy' and 'bibliothecal science' are not mentioned in the literature, but they were well-known in the 1800s. 'Economy' signified 'the art or science of managing a household, *esp.* with regard to household expenses' in the 1500s, but in the 1600s took on the wider sense of the art or science of 'the administration of the concerns and resources of any community or establishment with a view to orderly conduct and productiveness' (*OED*). Rullmann (1874) described his work as "the science of library management with a view to common organization among libraries, and to the special study of library science in German universities" (see Section 5.6. in this chapter); Rullmann is noteworthy because he was quoted at some length by the editors of the influential survey conducted for the United States Bureau of Education and published as *Public Libraries in the United States of America; Their History, Condition, and Management* in 1876; it should be mentioned, however, that his work was not subsequently cited in the American definitional literature.

By the late 1800s the terms 'library economy' and 'library science' were used interchangeably. Some deplored the latter term and promoted terms such as 'library service'. As recently as 1971, Hulbert argued:

> The term *library science* would seem to imply a body of specific knowledge with laws and principles derived through the scientific method, as in the natural sciences. . . . *Library service* . . . is more acceptable nomenclature, and while it excludes pretensions to being scientific, it suggests and underscores the basic mission of the profession. (p. 124)

The term 'bibliothecal science' was denoted in 1811 as 'belonging to a library', deriving from the Old English (i.e., pre-1150) term 'bibliotheca', the original name of the Bible in English; later, in the early 1800s, the term signified 'a collection of books or treatises, a library' or 'a bibliographer's catalogue' (*OED*). On rare occasions, the term 'bibliothecal science' appeared in the literature, but it was never used as a subject heading in *Library Literature* or in its predecessor for the period 1867 to 1920, H.G.T. Cannon's (1927) *Bibliography of Library Economy*.

The term 'bibliology' has also appeared sporadically in the definitional literature. The *OED* notes its use in 1807 as 'scientific description of books, book-lore; bibliography'. Molnar (1968) has discussed the conception of 'bibliology' and its relationship to library science.

The only other term which has been applied to the domain of interest here is 'applied bibliography', which was employed by Irwin (1949). The term 'bibliography' signified in the early 1800s either 'the systematic description and history of books, their authorship, printing, publication, editions, etc.', 'a book containing such details', or 'a list of the books of a particular author, printer, or country, or of those dealing with any particular theme; the literature of a subject'; Dibdin considered it to be in its infancy in England in 1814. An earlier sense in the 1600s of bibliography as 'the writing of books' had become obsolete by then (*OED*).

Two other neologisms can be mentioned. The term 'librametry' was coined in 1948 by Ranganathan (1957, p. 393) to signify the application of

mathematical tools to library science, along the lines of biometry, psychometry, and econometry; but he still designated the domain as library science. Another term, 'catenics', was coined by Taylor (1971, p. 107) to signify the study of the total communication system underlying academic librarianship; this, however, would constitute a much narrower conception than the traditional domain of library science is considered to encompass, and in addition it indicates a strong institutional binding.

3. The Nature of the Domain

By whatever name, the nature of the domain of library science has been variously conceived in the definitional literature. Library science has been taken as an activity, bibliothecal activity, practical activity, professional activity, or social activity, as an analysis, as an application or practical application, as an art, fine art, or the library art, as an arm of mass communication, as a craft, as a discipline, applied discipline, humanistic discipline, intellectual discipline, scientific discipline, or service discipline, as a form of intellectual engineering, as an enterprise, educational enterprise, or social enterprise, as a field, interdisciplinary field, or mission-oriented field, as a function, as a specialization in generalism, as an institution or social institution, as a body or branch of knowledge, organized knowledge, practical knowledge, or scientific knowledge, as elemental laws, as a branch of learning, as a management or an administration, as a method, as an occupation, as an office, as an organization, as a phenomenon, empirical phenomenon, or metaphysical phenomenon, as a practice, as principles or normative principles, as a body of problems, as a process, as a profession, evolving profession, humanistic

profession, learned profession, personal service profession, scientific profession, semi-profession, or service profession, as a role, as a department of scholarship, as a science, applied science, communication science, or social science, as a service or social service, as a skill, as a study, field of study, professional study, or scientific study, as a task, as a technique, as a vocation, and as a work.

Many definitions and quasi-definitions in the literature have also combined two or more of these terms in attempting to describe the nature of the domain of library science, for example, 'knowledge and skill' or 'principles, processes, and methods'.

4. The Focus of the Domain

There are three fundamental categories of focus or principal emphasis in the definitional literature of library science. These are: an emphasis on objects or artifacts, an emphasis on subjects or people, and an emphasis on both objects and people. The taxonomy by which extant definitions are ordered here is based in the first sort on this object-subject or thing-person distinction. This taxonomy is fundamental because the functions of librarians are logically related to the category of principal focus: some functions of librarians inhere in things, for example, collection management concerns objects collected, while other functions of librarians inhere in persons, for example the act of informing treats human recipients. These categories of functioning are sorted out as distinctive sets in the analysis which follows. These definitional sets are summarized in the table below.

TABLE 1

SUMMARY OF LIBRARY SCIENCE DEFINITIONS

Definitional Focus		Generic Terms
5. Objects	5.1.	To make accessible
	5.2.	To retrieve
	5.3.	To transfer
	5.4.	To process
	5.5.	To use or make useful
	5.6.	To keep or manage
	5.7.	To describe books
	5.8.	To regulate book production
	5.9.	To protect books
6. People	6.1.	To teach
	6.2.	To enlighten or inform
	6.3.	To create readers and elevate literary taste
	6.4.	To inspire
	6.5.	To amuse or entertain
	6.6.	To conduct research and advance knowledge
	6.7.	To manage knowledge
7. Objects and People	7.1.	To make accessible
	7.2.	To retrieve
	7.3.	To transfer
	7.4.	To supply
	7.5.	To counsel
	7.6.	To advocate
	7.7.	To link
	7.8.	To use or maximize utility
	7.9.	To interpret
	7.10.	To manage
	7.11.	To study

5. Definitions about Objects

Functions of librarians with respect to objects are set forth in this section. The table below indicates each definitional set of generic and synonymous terms.

TABLE 2

LIBRARY SCIENCE DEFINITIONS ABOUT OBJECTS

	Generic Terms	Synonymous Terms
5.1.	To make accessible	To make available render accessible provide access
5.2.	To retrieve	
5.3.	To transfer	To distribute disseminate communicate provide spread purvey
5.4.	To process	To handle manipulate restructure repackage
5.5.	To use or make useful	To utilize exploit render useful
5.6.	To keep or manage	To organize administer found, organize, and administer create and administer organize and manage form and carry out have charge of house protect guard conserve store preserve archive
5.7.	To describe books	To authenticate study list
5.8.	To regulate book production	To direct police filter
5.9.	To protect books	To defend fight in behalf of

It should be noted that in the exposition which follows, three or four exemplar definitions in each generic set are cited in the text; additional statements are quoted in Appendix I. The general convention for selecting

exemplar definitions for the text is to cite the earliest and the most recent statements, together with one or more intermediary statements from somewhere in the mid-1970s if available.

5.1. Definitions about Objects: To make accessible

This set of definitions focuses on accessibility and availability of artifacts. The following exemplar statements convey their sense:

Schrettinger, 1808:

> [Library science encompasses] all precepts necessary to the practical organization of a library, provided that they are based on sound principles and reducible to one supreme principle . . . [namely, that] a library must be arranged in such a way as to render speedily accessible whatever books are required to fill every literary need. (p. 393 in Grasberger, 1954)

Shera, 1972:

> Yet the historical role of the library is very far from being complex, nor has it been difficult to define. One may even suggest that this very simplicity explains the absence of an underlying philosophy; for from its very beginnings, the central and unifying concept of the library has been its dedication to *assembling, preserving, and making available for use the records of human experience*. . . . (p. 191)

Swanson, 1979:

> The central problem for research libraries is how to provide the kind of access to recorded information that best facilitates the growth of knowledge. . . .
> . . . .
> The problem of bibliographic control and access in principle transcends the limits of local libraries. . . . (p. 112)
> . . . .
> [All] libraries are concerned in one way or another with acquiring, organizing, and providing effective access to recorded information. (p. 113)

Comments

This set of definitions is incomplete because the focus is on the

artifacts: access facilitation for whom or for what is ignored.

5.2. Definitions about Objects: To retrieve

This small set of definitions is of recent introduction to the definitional literature of library science.

Meadow, 1973:

> [Librarians] are in charge of classifying, storing, and retrieving information, . . . (p. vii)

Orr, 1977a:

> Libraries are communication systems, analogous to the human memory. They store, retrieve and disseminate information, knowledge and data. . . .
> . . . .
> [It] is probable that the most difficult function of the library is that of retrieval, and there is much to be said for making this the focus for all studies *in* librarianship. (p. 59)

Comments

This generic function is treated more fully in Chapter Three.

5.3. Definitions about Objects: To transfer

This set of definitions encompasses a variety of synonymous and quasi-synonymous terms. Among them are: to distribute, to disseminate, to communicate, to spread, and to purvey.

Danton, 1949:

> [Librarianship constitutes] the complex and frequently highly complicated bibliographical and professional tasks connected with the ordering, cataloging, classification, dissemination, and general administration of the book collections of a modern library. (p. 5)

Giuliano, 1969:

> I would like to see the field of librarianship defined in terms of the knowledge transfer function, rather than in terms of the library institution.
> . . . .
> The knowledge transfer function encompasses those procedures necessary and appropriate for the assembling of knowledge, its systematic organization, its restructuring and representation, its storage, its retrieval and dissemination. (p. 344)

Shinebourne, 1980:

> Success in providing the right book(s) at the right time has always seemed to me the goal of our operations. (p. 135)

Comments

This set of definitions focuses on actions by the initiators but ignores recipient actions. The terms here are technically imprecise because persons other than librarians function to transfer objects, including information and knowledge, across time and space; among them are publishers, journalists, and teachers.

5.4. Definitions about Objects: To process

This set of definitions encompasses terms such as the following: to handle, to manipulate, to restructure, and to repackage.

Temple, 1949:

> I define librarianship as "the art and science of reducing to order the various forms of the recorded word and idea, and of manipulating them for a definite purpose". (p. 36)

Clapp, 1965:

> This report of research on concepts and problems of "Libraries of the Future" records the results of a two-year inquiry into the applicability of some of the newer techniques for handling information to what goes at present by the name of library work--i.e., the operations connected with assembling information in recorded form and of organizing and making it available for use. (p. v)

Garrison, 1977:

> Where we should be talking in terms of the *principles* involved in acquiring, screening, cataloging, storing, repackaging, and providing access to information of all kinds we still spend most of our time talking about institutional techniques of information handling in libraries. (p. 179)

Comments

Like the function of transfer, this is an ambiguous and imprecise set of definitions. The terms here do not mark off a unique functioning of the domain of library science.

5.5. Definitions about Objects: To use or make useful

Synonymous terms for the function of using objects or making them useful include to utilize, to exploit, and to render useful.

Danton, 1934:

> The following [definition] . . . , though admittedly imperfect, is sufficiently inclusive and concise for our purpose: Librarianship or library science is that branch of learning which has to do with the recognition, collection, organization, preservation, and utilization of graphic and printed records. (p. 64)

Taylor, 1971a:

> [Librarianship] or library science (and these terms are interchangeable for me, as far as their content goes) is concerned with the organization and exploitation of collections of documents. (p. 466)

Atkinson, 1974:

> Among the definitions of a 'library', perhaps the best is the simplest--a collection of books and other material made useful. Put equally simply, librarianship is the practice of collecting such material and making it useful. (p. 13)

Comments

The function of using objects is beyond the domain of library science.

The use of objects, including information and knowledge, is the action of users, inquirers, authors, researchers, and the like. The term 'use' or 'utilization' was criticized by Egan (1956):

> The long-accepted definition of a library is "a collection of books organized for use," the definition of books having been expanded to include all types of library materials, such as periodicals, pamphlets, films, maps, patents, etc. To define a librarian as one who collects and organizes books for use would probably arouse little opposition. But these definitions merely describe what is done by librarians, or within libraries, without reference to any purpose, other than the very vague "use," for which these operations are performed. The only definition which attempts to specify goals, and which has had any general acceptance, is an enumeration of purposes for which books may be used, such as research, education, information, recreation, aesthetic appreciation, and civic responsibility. . . . These are indeed purposes for which books may be used, but books can exist and can be used for all of these purposes without libraries; no one of them establishes any ineluctable tie with librarianship. There is no one of these general goals for which the library has sole responsibility. . . . (pp. 522-523)

An additional difficulty with the function of use is that the definitions do not indicate who will do this using. If the use is conceived to be use by the librarian on behalf of inquirers, then such use is of a different kind than if it is conceived to be use by the inquirers directly.

5.6. Definitions about Objects: To keep or manage

This set of definitions encompasses a wide variety of synonymous and quasi-synonymous terms. Among them are the following: to organize, to administer, to form and carry out, to house, to guard, to conserve, to store, and to preserve.

Rullmann, 1874:

> [A system of uniform bibliographic arrangement of headings and subheadings, of uniform cataloging principles, and of uniform shelf arrangement of books] greatly facilitates the use of libraries for our men of science. . . . Supposing that a uniform library system according to our ideas should gradually become prevalent, we do not

> thereby have a sufficient guarantee of the greatest possible perfection of our libraries. For this will essentially depend on a suitable library administration. . . . (p. xxiv in *Public Libraries in the United States of America; Their History, Condition, and Management* (1876), hereafter referred to as *Public Libraries*, 1876)

Benge, 1970:

> The available definitions of librarianship all include four main areas of activity. They indicate that librarians are responsible for:
>
> 1 The collection of material appropriate for libraries.
> 2 The preservation of the material.
> 3 The organisation of the collections.
> 4 The dissemination of the material or the information which it contains. This may include interpretation.
>
> Preservation and organisation (2 and 3) are often treated as one, so that the function has been expressed simply as acquisition, management and use of appropriate material. This is convenient, but the word 'use' is not accurate, and what is required is something to indicate 'making available'. . . . (p. 222)

North Atlantic Treaty Organization, 1977:

> Library Science. The study of the laws and principles that govern the operations of the institution of the library. This includes the theoretical and technical formulations governing the management and logistics of both the internal and external constituents of the institution, namely, operating and using elements. (p. 8)

Comments

The most frequently recurring theme in the definitional literature of library science is the managing of a library or of the library collection. This is manifested in the earliest term 'library-keeper' (also 'librarie-keeper') which was in use in the 1600s but became supplanted by 'librarian' in the next century. A 'librarian' signified 'the keeper or custodian of a library' and a 'library' was either 'a place set apart to contain books for reading, study, or reference', or 'a large collection of books, public or private'. (Chaucer had used the term 'lybrarye' around 1374.) Earlier senses of 'librarian' which have not survived were those of 'a scribe, copyist', noted in 1670, and of 'a dealer in books', noted in 1734; also

obsolete are 'librarier', in 1483 signifying 'a bookseller' but by 1667 'a librarian'; and 'librarianess', noted in 1862 as 'a female librarian' (*OED*).

The principal emphasis in this set of terms is on the organization of objects, generally book collections; library management was frequently taken to be a scientific or at the very least a systematic activity. The objectives of the management activity were to preserve or conserve and to guard or protect the library and its contents; the early term 'library-keeper' reflected this custodial emphasis, in much the same way that in the 1800s "the basic task of the traditional teacher was considered to be *schoolkeeping* rather than *school teaching*", that is, of maintaining order (Swift, 1971, p. 322). In addition to the custodial emphasis, certain book control processes were implicit in the preserving and protecting functions: materials had to be acquired or collected; and they had to be organized or arranged in some kind of order, that is, cataloged and classified. McAnally (1971) has described this custodial emphasis as "housekeeping, or the mechanics of keeping the books--ordering, cataloging, and classifying them." He noted:

> Concerned as they were with housekeeping tasks, most of these early librarians rarely recognized any differences in level of duties to be performed. Everything that was done in a library was librarianship. Consequently, they did not separate clerical from professional tasks. . . . (p. 20)

Butler (1933) asserted that the librarian "is merely society's custodian of its cultural archives," responsible for exploiting them "for communal advantage" (pp. 105-106). Like McAnally much later, there were early critics of this emphasis. Among them, Miller (1936) challenged the institutional focus in the search for fundamentals:

> If we start with the library as the foundation for our philosophy, or if we assume the library as the end desired, our thinking may easily become so institutionalized as to ignore or

> even distort the fundamentals involved. Our professional existence is likely to be so identified with the typical institutions in which we serve that our arguments will plead prestige and increased support from the public. (p. 298)

This danger has indeed been realized in the terms common to the domain: 'library philosophy', 'library school', 'library education', and of course 'library science' itself still predominate in the definitional literature. The institutional binding is pervasive.

Finally, and in the same vein, there is a confusion in this set of definitions between books and libraries. Johnson (1970), for instance, wrote:

> Thus, directly or indirectly, modern European culture is a product of its preserved heritage in graphic form--in other words, of its libraries. (p. 495)
> . . . .
> Cultural progress comes from accumulated experience and knowledge; records of that experience have been best kept in graphic form--in the form of books and libraries. (p. 497)

This conflation of books and libraries into a single phenomenon or concept has impeded clarity of domain definition, since functions with respect to books and functions with respect to libraries cannot be taken as identical. Molnar (1968) criticized this thinking:

> Books and libraries, as vehicles and preservers of human knowledge and the foremost representatives of our culture, are generally assumed to be phenomena closely connected and correlated. As, however, the world of our culture in general, "the part of reality created by human efforts" (Gorki) is considerably more extensive than the world of written culture ("civilisation écrite"), the ranges of function of books and libraries are by no means identical, but are logically related as genus and species, i.e. general and special, and are in their scope and compass at any rate different. (p. 1)

This conflation of libraries with books is inherent in a number of definitions of library science which have taken the central function of librarians to be the description of books as physical entities, as artifacts. The next set of definitions from the literature focuses on this activity.

5.7. Definitions about Objects: To describe books

The description of books--bibliography--as a definitional focus of library science is the oldest tradition and was closely associated with the pre-nineteenth century notion of the librarian as a scholar and gentleman in the service of other scholars and gentlemen (Rovelstad, 1977, pp. 9-10). In the Schrettinger (1808) conception of library science, bibliography had been clearly excluded, but this was ignored by much of the subsequent literature. Indeed, many of the definitions treated bibliography as coequal with management in encompassing the domain of library science. The 1853 "Call for a Convention of Librarians" at the University of the City of New York read, in part:

> The undersigned, believing that the knowledge of Books, and the foundation and management of collections of them for public use, may be promoted by consultation and concert among librarians and others interested in bibliography, ... (p. 2 in Holley, 1976)

Dewey (1887) noted that library science included administration ('library economy' he called it), cataloging, classification, and bibliography (p. 80 in White, 1976). Hitchler (1909) defined library science as library economy (practical application of library science) and bibliography. The American Library Association (1943) definition introduced the term 'bibliology' to signify 'the science of books' and 'bibliography in its widest sense'; curiously, library science was subsumed under this notion, together with other activities such as bookbinding (see Appendix I).

A few definitions of the domain of library science focused exclusively on bibliography as its essence:

Irwin, 1949:

> "Librarianship is that branch of learning which has to do with the recognition, collection, organisation, preservation and utilisation of graphic and printed records".
> . . . .
> What is this in a single word? Surely the answer is *bibliography*.

> Bibliography indeed is the alpha and omega of all that is comprised in our definition. And we use the term bibliography in its widest sense. Bibliography is the study of the book throughout its life, from its earliest beginnings with the author's manuscript, the compositor's type and the binder's tools, to its climax and to the achievement of its final goal in the scholar's study, on the library bookshelf or by the fireside at home. Everything connected with the making of the book from its birth to its final decease, and with the rendering of it accessible to the student, is the proper study of both the bibliographer and of the librarian.
> . . . .
> [We] shall do well to regard the subject of librarianship as *applied bibliography*, reserving pure bibliography for the field of book collecting. (pp. 62-63)
> . . . .
> The librarian is concerned with books as vehicles of knowledge rather than objects of art. . . . (p. 64)

Landau, 1966:

> [Bibliography] is the *sine qua non* of librarianship. . . . (p. 247)

Shaughnessy, 1976:

> The specific manner in which he [the human being] deals with the phenomena in his search for truth is his inquiry methodology.
> . . . .
> [The] inquiry methodology which appears to be indigenous to librarianship is bibliography broadly defined. Bibliography in this context has a two-fold meaning: subject knowledge of a discipline or disciplines, and knowledge of the methods or processes by which that subject knowledge is produced, recorded, acquired, organized, preserved, communicated, and interpreted for use. (p. 168)

Comments

The emphasis on books or graphic records as the focus of the domain of library science suggests that the scholarly activity of describing and listing these intellectual carriers is an end in itself, indeed, is the basic function of the librarian. This set of definitions ignores the interaction of the librarian's bibliographic and human service activities. The describing and listing function is a means to some other objective for the librarian, not an end in itself. Irwin (1949) acknowledged this in a very limited way, in modifying his conception to 'applied bibliography':

> Though we cannot neglect the outward form of books, our eyes are turned rather to their matter and content. The primary consideration

is their value to the student for a particular purpose. The analysis of their contents and a critical appreciation of their intrinsic worth and possible uses in the light of current needs governs our approach to this subject. We are concerned with the *use* of books, and we take into account their physical nature only in so far as it contributes to their use. And we cannot consider the use of books without also knowing something of the actual needs and purposes of the readers who may wish to use them. In this we have advanced far beyond the confines of pure bibliography and have reached the very heart of librarianship. We are still however in the country of bibliography, because our subject is still the study of the book--the printed record. (p. 72)

5.8. Definitions about Objects: To regulate book production

This is a "set" of one definition:

Ortega y Gasset, 1934:

> Here, then, is the point at which I see the new mission of the librarian rise up incomparably higher than all those preceding. Up until the present, the librarian has been principally occupied with the book as a thing, as a material object. From now on he must give his attention to the book as a living function. He must become a policeman, master of the raging book.
> . . . .
> Is it too Utopian to imagine in a not too distant future librarians held responsible by society for the regulation of the production of books, in order to avoid the publication of superfluous ones and, on the other hand, to guard against the lack of those demanded by the complex of vital problems in every age? (p. 209)
> . . . .
> It seems to me that the hour has arrived for the collective organization of books production.
> . . . .
> [This] organization would not be of an authoritarian character, no more in fact, than the internal organization of works in a good academy of sciences. (p. 212)
> . . . .
> [The] librarian of the future must direct the non-specialized reader through the *selva selvaggia* of books. He will be the doctor and the hygienist of reading.
> . . . .
> I imagine the librarian of the future as a filter interposed between man and the torrent of books. (p. 213)

Comments

Clearly, the functions of regulating and controlling book production

are logically distinct from that of directing the reader, and these together are distinct from the function of filtering. Ortega y Gasset's motivation for advocating the regulatory function of book production was to confront the gravest negative attributes of the book, which he took to be three: 1) that there were too many books; 2) that there were too many stupid and useless books and not enough books for research; and 3) that people read too much and thought too little (pp. 209-213). In this context, it is manifest that control, direction, guidance, and restriction of book production would also function to restrict readers and reader choice. The rationale for book regulation is totally inadequate as a definition and so also as a function for librarians.

In addition, the librarian as doctor and hygienist of reading is merely metaphorical, a slogan, since this medical analogy distorts the functioning of the physician.

5.9. Definitions about Objects: To protect books

This is another definitional "set" of one.

MacLeish, 1940:

> If it is the intellectual book rather than the physical book of which the librarian is keeper, then the profession of the librarian is not and cannot be the neutral, passive, negative profession of the guardian and fiduciary, but must become instead the affirmative and advocating profession of the attorney for a cause. For the intellectual book is the Word. (p. 17)
>
> . . . .
>
> Whatever the duty of the librarian may have been in a different world and a more peaceful generation, his duty now is to define--to say, to fight, and to defend. No one else--neither those who make the books nor those who undertake to teach them--is bound as he is bound to fight in their behalf, for no one else is charged as he is charged with their protection. No one as much as he must say, and say again, and still insist that the tradition of the written word is whole and single and entire and cannot be dismembered. No one is under obligation as he is under obligation to meet the mutilators of the Word, the preachers of obscurantism, the suppressors. (p. 19)

Comments

MacLeish's advocacy of protecting and defending books has a larger objective, which is to prevent or challenge intellectual censorship. Since censorship encompasses other media of communication and other constituencies in society, political and ethical domains are involved. Book defence as an element in freedom of expression is a political act, rather than a principal function of the librarian qua librarian. This would not rule out book defence as an auxiliary activity in the domain of library science, however.

6. Definitions about People

The foregoing sets of definitions exhibit the general conceptual weakness that they do not recognize the social nature of the specified functions; that is, the definitions do not mention that human beings are involved as the recipients of the librarian's functioning, nor do they indicate in what capacity or capacities such recipients are involved. The focus is on manipulation of objects without specification of why. This incompleteness characterizes all the sets in this general category of the taxonomy of library science definitions about objects.

While a number of critics (Wassmerman, 1972, for example) have set forth the inadequacies of a domain of library science focused on the artifacts of thought, the focus on cognitive and behavioral changes in human beings is an equally inadequate conception of the nature of the domain. Definitions of this type are treated below.

The sets of definitions which emphasize people are particularly notable for conceiving of functions of librarians that seek to influence, to

change, to transform, or to manipulate human thought and human behavior. In these definitions, functions with respect to artifacts are ignored, considered incidental, or treated as merely instrumental means to bringing about the desired effects on human beings. That is to say, the librarian is taken to be the actor and the recipient is taken to be a purely passive receptacle.

Functions of librarians in the definitional literature of library science with respect to human referents are sorted and grouped into seven generic sets. They are presented below.

TABLE 3

LIBRARY SCIENCE DEFINITIONS ABOUT PEOPLE

	Generic Terms	Synonymous Terms
6.1.	To teach	To educate educate informally direct self-education regulate individual instruction provide self-education provide self-teaching provide means for self-education provide library use instruction serve independent study serve informal education serve education serve self-education serve the cause of education meet educational needs implement the educational process distribute tools of education strengthen and clarify social values promote ideological and cultural education promote knowledge organize information bring the past to the present diffuse knowledge disseminate knowledge supply good reading instruct influence direct advise and direct

TABLE 3--Continued

	Generic Terms	Synonymous Terms
		To advise and counsel
		guide
		communicate
6.2.	To enlighten or inform	To encourage book production in foreign languages
		advise and help
		stimulate interest
		be a mental irritant
		promote sympathy
		allure to knowledge
		awaken interest
		stimulate inquiry
		advise scholars
		lead intellectually
		propagate truth
		shape thinking
		guide thinking
		help create thinkers
		maintain freedom of thought
		develop an international mind
		sponsor ideas of Christian democracy
		combat prejudice
		promote advancement of scientific truth
		contribute to international understanding
		provide full and impartial information
		serve enlightenment
		aid in spread of truth
		aid knowledge, thinking, and reason
		promulgate reliable information
		promote intellectual life
		provide intellectual tools
		encourage participation in critical discussion
		supply literature for understanding, judgment, and prudence
		guide into wisdom
		promote socialist culture and science
		elaborate Marxist-Leninist principles
		utilize literature for communist education
		serve as instruments of social and political change
		serve freedom of thought
		push back ignorance
		promote knowledge
		spread intelligence
		help to create a better world
		arbitrate and ameliorate differences
		bring people together

TABLE 3--Continued

	Generic Terms	Synonymous Terms
		To teach understanding
		make intelligent
		improve conversation
6.3.	To create readers and elevate literary taste	To redirect reading patterns
		get good books read
		create impulse to read
		promote intellectual culture
		persuade people to read best books
		exclude the pernicious
		furnish culture
		develop book taste
		create a desire to read best books
		lead to best books
		value reading as a good
		enlarge horizons
		work for moral and social development
		purvey literary supplies
		make people glide into instructive reading
		control reading
		assist and direct reading
		control and guide reading
		induce reading
		induce good reading
		develop taste for better books
		cultivate appreciation of books
		preserve and promote artistic values
		lure readers to read for knowledge
		support and encourage creative work
		raise literary level
		introduce individual to great literature
		motivate use
6.4.	To inspire	To contribute to awakening, inspiration, and development
6.5.	To amuse or entertain	To furnish entertainment
		purvey entertainment
6.6.	To conduct research and advance knowledge	To provide connections between fields
		integrate knowledge
		extend knowledge
		help advance knowledge
		enhance knowledge
6.7.	To manage knowledge	To organize, relate, and structure knowledge and concepts
		order, relate, and structure knowledge

6.1. Definitions about People: To teach

This set of definitions conflates a number of notions: teaching, education, enlightenment, and learning. Some conceptions of the librarian equate their function with the function of the teacher, while others equivocate by claiming some unspecified educational role for the librarian.

Dewey, 1876:

> Then, having the best books, he must create among his people, his pupils, a desire to read these books. He must put every facility in the way of readers, so that they shall be led on from good to better. He must teach them how, after studying their own wants, they may themselves select their reading wisely. Such a librarian will find enough who are ready to put themselves under his influence and direction, . . . (p. 22)
> . . . .
> The school teaches them [lower class children] to read; the library must supply them with reading which shall serve to educate, and so it is that we are forced to divide popular education into two parts of almost equal importance and deserving equal attention: the free school and the free library.
> . . . .
> The time *was* when a library was very like a museum, and a librarian was a mouser in musty books, and visitors looked with curious eyes at ancient tomes and manuscripts. The time *is* when a library is a school, and the librarian is in the highest sense a teacher, and the visitor is a reader among the books as a workman among his tools. (p. 23)

Shera, 1973:

> The library should be the "crowning glory" of our educational system, . . . [and] the library should also be a place to which the good citizen can turn to make himself a better, more enlightened citizen. (p. 106)

Mikhailov and Gilyarevsky, 1978:

> [The] principal task of the libraries--more particularly public ones, though special ones largely as well--has become that of ideological and cultural education. It is in this direction that the specialisation of librarians has proceeded; librarians turning more and more into ideological workers, educationists and knowledge promoters among broad sections of the population. (p. 131)

Comments

Danton (1934) observed that "the whole relation of the library to education is one of appalling medievalism" and the definitional literature

linking the two has also reflected this. More recently, in a landmark work, Wilson (1979) described the idea that librarians are teachers as an "organization fiction" (p. 146)

A number of factors may be identified that shed light on past and present theoretical relations between library science and education. In the first place, the function of teaching has been conflated with several related but distinct concepts: education, enlightenment, learning, rationality, reading, literacy, citizenship, and even political democracy. Education and learning taken as reading is a persistent theme in the definitional literature of the late 1800s and early 1900s. Wheeler (1946), for instance, asserted that "most real study and constructive thinking as well as intelligent doing . . . depend on books"; but he went on to point out that it did not therefore follow that libraries were justified "in attempting everything educative" (p. 15). More recently, Christ (1972) argued that "the process of using recorded knowledge is an educational activity" (p. 80).

Another related confusion was the assumed dependence between reading and citizenship. Garceau (1949) summed up the beliefs this way:

> Out of this past has come what we may call the library faith. It is a fundamental belief, so generally accepted as to be often left unsaid, in the virtue of the printed word, the reading of which is good in itself, and upon the preservation of which many basic values in our civilization rest. When culture is in question, the knowledge of books, the amount of reading, and the possession of a library--all become measures of value, not only of the individual but also of the community. (p. 51)

The American library, he said, was created, among other purposes, as "a source of knowledge for an informed citizenry, upon whose collective judgment the success or failure of responsible democracy rests" (p. 51). However, as Hesse (1964) pointed out:

> The librarian must know that his work is in any case social work, and it is a fact that since there exists no society without politics,

> this work has also its political conditions. . . . The ethics of the librarian require him to be fully aware of what kind of politics he serves with his work and whether it agrees with the humanitarian essence of his work. (p. 5 in Molnar, 1968)

Objectives in the domain of political organization and state-citizen relations are the principal concern of political philosophers, politicians, statesmen, and lawyers. The political dimension, however, is not the central concept of the domain of library science. Broadfield (1949) has noted that librarians have tended to regard readers as citizens but that "the best books are not written for citizens" (p. 35). He argued that:

> The aim of education and of librarianship, whose purpose is educational although its methods and assumptions are different from those of education as commonly understood, ought not to be to produce the 'exemplary citizen', since this by definition makes men copyists.
> . . . .
> If books produce scholars, who cares whether they are Americans? (p. 36)

Another factor in the fuzzy relations between library science and education has been education taken as lifelong learning, as human enlightenment or human cultivation. One of the most extreme proponents of such a conflation is Shores (1969, 1971) who suggested that libraries are involved with "the record of civilization" taken as "the sum total of man's communication possibilities"; this he equated with "evidence of life" (1971, pp. 215, 216). In this view, all life became library science, and, indeed, Shores presented a "format classification of library media" in which were included radio and television; natural resources such as mines and forests; social resources such as museums, airports, and hospitals; and human resources such as inventors, travellers, and poets (p. 218). It is clear, however, that education taken as lifelong learning is a broader concept than education taken as teacher-student relations. Also, education as self-education or independent study is conceptually distinct from educative processes in which the teacher not only guides the student but evalutes his

or her achievements as well. Learning by reading is not conceptually interchangeable with learning by library use and neither of these is conceptually equivalent to the function of teaching or to the function of the librarian.

Another difficulty with respect to the relations between library science and education has focused on library use instruction. The relevant definitional literature here has consistently confused this activity with the teaching activity. Wheeler (1946) observed that:

> While all adult library service is a form of adult education, the contact between library materials and seekers for self-education has in the main taken the specific form of reader's advisers with specialists trained in book knowledge and in the techniques of guiding individuals to the best books for self-development. This emphasis, often touching on several fields, is cultural and general rather than vocational or of a research nature. (p. 13)

Wilson (1979) has argued that library use instruction "would be better thought of as informing rather than as teaching" (p. 157). She contended that although librarians are part of the system of education, not all educational roles in the social institution of education are teaching roles, for instance, the counsellor, computer analyst, and principal, in addition to the librarian. Moreover, she noted that the teacher is concerned with the content of graphic records, while the librarian is concerned with the graphic record as an entity:

> The librarian's dissemination of the graphic record differs from that of the teacher. The librarian does not disseminate content and does not disseminate by teaching but by means of library processes, by means of a librarian's behavior--by creating, operating, and maintaining a library and providing library services through the myriad behaviors that these require. (p. 155)

A further factor in sorting out the respective domains of library science and of education has been a persistent vein of school and college criticism throughout the past century, from Dewey in the late 1800s to Shores (1969). When the teacher's function was restricted to "schoolkeeping"

rather than "school teaching", when universal compulsory education was still an altruistic dream (not until 1919 did all the United States states have such legislation according to Swift, 1971, p. 328), and when reading books was still considered the essence of education and enlightenment, it was relatively simple for librarians to advocate a much expanded social function for themselves with respect to educational activities taken as synonymous with human cultivation.

Moreover, Goldhor (1942) noted the distinction between education and reinforcement, the latter being antithetical to the former. He wrote:

> Successful education may be said to involve a relationship between the teacher and the student of such a kind that the mind of the latter is led in a certain direction; in this sense, education can be thought of as a series of planned experiences such that the reaction patterns of the student are altered in a way that the instructor wishes, by his exposure to certain experiences and not to others. It is this characteristic of education that requires of every curriculum a clear statement of the goals to be sought.
>
> It may be objected that to require this element in every educational situation makes for too narrow a definition. If the term is to mean anything, however, it must be defined rigorously to distinguish it from such allied terms as learning and knowledge and training and to differentiate it from the concept of education that would identify it with all of life. This factor of change on the part of the pupil, directed and purposive change and other than that due solely to growth, is possibly the *sine qua non* of true education. This makes education a painful process, for it involves the acquisition of strange new patterns of thought, if not also the destruction of existing and therefore pleasantly familiar patterns. (p. 116)

He concluded that:

> The probability is that the bulk of our public library patrons seek clarification and reinforcement in their thinking rather than the unsettling experience of education [in the sense of purposively guided change]. While the school has an obligation laid on it by society to direct the education of youth so as to mold their thinking in line with the mores of the race and to develop in them the mental equipment they will need to carry on civilization, the library is under no such obligation. Analysis of the conditions under which it operates shows that the public library is unsuited to accomplish any great amount of real education; analysis of the actual functioning of the public library reveals that an important use to which people are putting its resources is that of reading for reinforcement.

> Where education results in breaking down existing patterns of thought and to that extent unsettling the individual, reading for reinforcement involves a cementing of those patterns and the reassurance to the individual of the worthwhileness of his place in society. (p. 118)

Goldhor's analysis has been largely ignored in the definitional literature of library science alleging an educational function for librarians.

6.2. Definitions about People: To enlighten or inform

This set of definitions is closely related to the previous set treating of education.

American Social Science Association, 1871:

> [Quoting from a report on a proposed library for Milton, Massachusetts,] "Libraries, accessible to the people, have always been encouraged in the most intelligent and advanced communities. The father of social libraries in this country is Benjamin Franklin. They took for their model the proprietary library of Philadelphia, which was founded in 1731, mainly by his exertions. To use his own words, they 'improved the general conversation of Americans, made the common tradesmen and farmers as intelligent as most gentlemen in other countries,' . . . By the concurrence of all testimonies, they have already achieved a great work in spreading intelligence among the masses, particularly among artisans and families of limited means. . . ." (pp. 6-7)

Johnson, 1970:

> [The] library and its related institutions have a tremendous task to perform in human relations, whether on the local, national, or international level.
> . . . .
> Mutual understanding is one way . . . that these [cultural] conflicts can be resolved, and the library is one of the best means of reaching this understanding. Instantaneous communication, via electronic means, has reached the point where it is conceivable that one man's voice could be heard at one time by all the people on earth. This is good, but it also presents dangers. By accident or intention, these electronic means of communication could plunge the world into chaos in seconds. But graphic communication, on the other hand, is a somewhat slower process. It can and must be a more considered process. Through the books, magazines, newspapers, recordings, pictures--the tools of the library--graphic communication must be employed to bring the element of thoughtful contemplation into the consideration of world, national, and local problems. They must be used to bring people together, to teach them to understand each other, to arbitrate and mediate

> differences, . . .
> . . . .
> Books and libraries can play a most important role in this effort toward world peace and toward arousing the people of the world to fight ignorance, intolerance, disease, and poverty instead of each other. Books and libraries have helped to create what we call western civilization; they can and will help to create a better world. (pp. 499-500)

Boorstin, 1981:

> With the worldwide rise and multiplication of chauvinism, the library and books remain our escape from the prison of the present, our deprovincializing machines--helping us fulfill the hopes of our founders for an enlightened citizenry in a freer world. (p. 596 in *American Libraries*, 1981)

Comments

The function of enlightening or informing without further precision is an inadequate conception of the domain of library science. This function is a general description of the activities of a diverse range of agents, including journalists, authors, researchers, publishers, teachers, and counsellors.

Moreover, there is a persistent conflation of education, enlightenment, cultural advancement, and democratization. Danton (1934) raised a number of issues in this regard:

> [The library is] a vital, creative, educative force for the advancement of civilization. (p. 74)
> . . . .
> [The] library is, along with the school system and the press . . . one of the chief and most powerful educative influences today. (p. 75)
> . . . .
> The library is one of the principal democratic institutions created, developed, and supported by our civilization. But can we assume from that fact that libraries are essential in a democracy? (p. 82)
> . . . .
> Granted that the library holds a pre-eminent place among democratic institutions, one might ask, further, whether the library is one of democracy's principal agencies for insuring an enlightened citizenry through the promotion of intelligent understanding of economic, governmental, and other social problems.
> . . . .
> It is maintained, and undoubtedly with justice, that libraries are educational institutions. This is far from saying, however, that libraries are essential to our educational system. (p. 83)

6.3. Definitions about People: To create readers and elevate literary taste

Closely allied to the definitional literature which takes the domain of library science as teaching, enlightening, and informing is a set of definitions emphasizing the creation of a certain class of readers and elevation of literary taste by means of "good books".

Dewey, 1876:

> [The ideal librarian] must see that his library contains, as far as possible, the best books on the best subjects, regarding carefully the wants of his special community. Then, having the best books, he must create among his people, his pupils, a desire to read these books. He must put every facility in the way of readers, so that they shall be led on from good to better.
> . . . .
> Such a librarian will find enough who are ready to put themselves under his influence and direction, and, if competent and enthusiastic, he may soon largely shape the reading, and through it the thought, of his whole community. (p. 22)

Knapp, 1955:

> [The librarian] values reading as a good in itself. He values skill in the use of the library as a tool for self-education. (p. 58)

Rothstein, 1968:

> We are convinced that librarians, by discriminating selection of materials and guidance in their use, can and should enlarge horizons and elevate taste within the community. (p. 157)

Mathews, 1976:

> Librarians left far behind the age-old stance of being ready to serve those who found their way to libraries; passed quickly through the stage of wanting to take library materials and programs out to people who would not come in, but wanted them. By the time they reached the end of the '60s, most librarians were ready to assume the more sophisticated and difficult responsibility of *motivating* use--of stimulating the desire, and the sense of need for information in those who had not developed it. (p. 85)

Comments

This set of definitions resembles the immediately preceding sets in that there is a strong emphasis on "good books" and their instrumental

efficacy. The cultural view implicit, and sometimes explicit, in them is that only one literary universe exists and that any residue is outside this universe of good taste. Butler (1933) cautioned against this conception of the librarian's functioning:

> The library is no mission station for the promulgation of an established literary gospel that is eternally true. The librarian's duty is not to entice men, against their wills if it need be, to convert themselves to his way of thinking. He is merely society's custodian of its cultural archives. The responsibility which he assumes with his office is to exploit those archives for communal advantage. (pp. 105-106)

Landau (1958) observed of books in general that "literary value and entertainment value are inextricably confused" (p. 173). The secular missionary role espoused by some librarians was described by Ennis (1964) as "a peculiar cultural imperialism" in which everyone should read good books, be educated, be freer, and above all be more refined (p. 176). Benge (1970) has noted that the moral uplift motivation is now less common among readers and that libraries must concern themselves with not only "high culture" but "low culture" as well, for each is a form of recreational reading. He argued that:

> In many quarters there has been a tendency to regard what is called 'light' reading as recreational, and to elevate other types of reading into a separate category called 'serious', and therefore non-recreational. This is an untenable distinction, . . . (p. 240)

The criticisms of cultural hegemony as the proper function of the librarian have led to a reorientation away from the "moral uplift" syndrome to the more neutral activity of providing artifacts for recreational or leisure reading, listening, and viewing.

6.4. Definitions about People: To inspire

This set of definitions is closely related to those which have

preceded.

Dewey, 1899:

> So the province of the library is to amuse, to inform and inspire. (p. 77)

Roberts, 1941:

> The librarian has of recent years been considered--by others beside himself!--as something more than a mere functionary or custodian, as, indeed, a leader of thought and social life; . . . This function, however, seems on the face of it to be purely intellectual, since he is the custodian mainly of fact-containing books; . . . [The] moral factor . . . cannot in practice be left out, for the very desire to read or learn which it is the librarian's job to satisfy raises questions of motive and purpose, . . . So that the librarian, in a sense the custodian of the public mind, with infinite possibilities of lasting good or harm, is bound to acknowledge a something-more-than-intellectual-or-moral, in a word a spiritual element in his work and life. (pp. 103-104)

Asheim, 1954:

> Functions of the library in society.
> . . . .
> F. To contribute to the awakening, inspiration and development of the individual. (p. 16)

Comments

Like the preceding criticisms of literary elevation, inspiration is an instrumental effect of the relevant artifacts which might be furnished by the librarian and others, but it is not an immediate function performed qua librarian.

6.5. Definitions about People: To amuse or entertain

Perkins, 1876:

> But the small circulating public library, like a retail shop, depends upon prompt gratification of the demands of the day.
> . . . .
> It cannot wait for the resort of scholars and students; it must attract readers for pleasure, rest, and amusement. It is not old

> learning, but new entertainment, that it must furnish; as well as learning, it must have popularity; as well as instruction, it must, primarily furnish entertainment; while waiting for the scholarly few, it must attract the many, and even the ignorant, frivolous, and thoughtless. (p. 420 in *Public Libraries*, 1876)

Line, 1965:

> [The directly functional ends of books and libraries are] as purveyors of information and entertainment. . . . (p. 270)

Thompson, 1974:

> The involvement of libraries in these cultural activities of society also involves them in the community's recreational and leisure activities. (p. 9)

Comments

Although the provision of amusing or entertaining books and other graphic materials might be an appropriate function for the librarian, some of the definitions in this grouping propose this as a direct objective. However, the librarian's function is purely instrumental in that relevant artifacts are furnished to individuals; the librarian does not do the amusing or entertaining directly, nor is it the librarian who directly produces the amusing or entertaining effects. Such a function would be the logical prerogative of an entertainer.

6.6. Definitions about People: To conduct research and advance knowledge

This set of definitions claims a direct contribution to the production of knowledge.

Dury, 1650:

> [If] the proper emploiments of Librarie-keepers were taken into consideration as they are, or may bee made useful to the advancement of Learning . . . they would bee of exceeding great use to all sorts of Scholars, and have an universal influence upon all the parts of Learning, to produce and propagate the same unto perfection.
> . . . .
> [Librarie-keepers] ought to becom Agents for the advancement of

universal Learning. (pp. 41-42)

. . . .

The proper charge then of the Honorarie Librarie-Keeper in an Universitie should bee thought upon, and the end of that Imploiment, in my conception, is to keep the publick stock of Learning, which is in Books and Manuscripts, to increase it, and to propose it to others in the waie which may bee most useful unto all; his work then is to bee a Factor and Trader for helps to Learning, and a Treasurer to keep them, and a dispenser to applie them to use, or to see them well used, or at least not abused; . . . (pp. 44-45)

Benge, 1970:

It is clear that any library which possesses any kind of research material has a research purpose: to provide material *for* the research worker. . . . [The] librarian is concerned mainly or solely with *bibliographical* research--to assist the users of the library. Since bibliographical work, such as abstracting or indexing or, particularly, literature searching, involves an investigation of subject content, it happens that librarians may disagree about the extent to which they should 'do the work of the researcher for him'. Where should the process end? What we need note is that many libraries do in fact take an active part in the research activity, which is in any case usually partly bibliographical. Librarians provide research material and they assist with its use. (p. 234)

. . . .

[Because] the growth points in modern knowledge develop *between* traditional disciplines, the librarian will become increasingly important as an integrating agent.

. . . .

[The] librarian's role is not simply to supply *information* in response to particular requests, or to make available material for those who require it, or to fill in gaps, but to *provide the connections*.

If those who prefer a more precise statement would ask '*what* connections?', the answer can only be that if we knew what connections are required there would be no need to make them. 'Insights' in the humanities cannot be planned or plotted, and the research scientist does not usually know what he is looking for. It is this which makes the library activity at its highest level worthwhile. (pp. 255-256)

Shukla, 1974:

Library is a social educational institution for the self development of man, through an organised collection, systematic communication and planned extension of knowledge. (p. 8)

Smith, 1980:

The librarian chooses the codes in which to categorize information and arranges the key words through which information can be extracted. He now becomes a kind of author, and the author, in many ways, turns librarian. The librarian becomes, in a sense, the sentinel at the gateway of information and knowledge, and society may come to find itself demanding to see his credentials. (p. 314)

Comments

The function of doing research and advancing knowledge is not logical to the librarian, for this is the function of a researcher qua researcher, whether quantitative, qualitative, performative, or developmental inquiry is being undertaken. This set of definitions conflates at least two notions: research and knowledge with literature searching; and research with research instruments such as books. Compiling a bibliography is sometimes referred to loosely as bibliographical or bibliographic research, but neither this nor literature searching are activities which extend the frontiers of knowledge. Rather, as Kaplan (1964) has noted, these activities represent "making available to particular people some things that were already known but not specifically known to them at that time" (p. 10). Solved problems cannot be claimed logically to be solved again, and so an increment to knowledge cannot be claimed if the knowledge is already extant. An adequate literature review is thus an instrument in preparation for research but does not itself constitute the act of research; its function is to rule out lines of fruitless inquiry. Kaplan argued that:

> There is no doubt that a great many people look increasingly upon the librarian as the magic helper, and they believe everything that is needed could be provided if only there were properly designed and operated systems in libraries. But they overlook the fact that discovery is still a creative effort in which the researcher himself has certain significant responsibilities. (pp. 10-11)

Helmstadter (1970) noted along these same lines that "once a problem has been solved and recorded, the transmission of the information to others is a matter of communication and education, not research" (p. 4). Thus, although the librarian might be seen to have an instrumental role in the conduct of research, the function of advancing knowledge does not logically inhere to the librarian.

Danton (1934) raised the philosophical question of the relationship between library science and the growth of knowledge. He suggested that it was premature to write of a metaphysical philosophy of the library, but that:

> The library as a social institution is, after all, but one phase of its philosophical implications. Does the library have a *Wesen* of its own and does it have metaphysical implications? That is, is the library an institution merely or does it contain within itself the germs of a philosophical relation to epistemological progress? The radio and the movie are, for example, like the library, agencies for the dissemination of ideas. But there are at least two great differences between them and the library in that they have in themselves a unity of sense and emotional appeal which the library lacks, and the library has certain intellectual fundamentals which, in general, do not apply to them, since they are now at least primarily aesthetic. (p. 85)

6.7. Definitions about People: To manage knowledge

This set of definitions treats of knowledge management.

Shera, 1961a:

> [Librarianship] is the management of knowledge. . . . The librarian is the supreme 'time-binder', and his is the most interdisciplinary of all the disciplines, for it is the ordering, relating, and structuring of knowledge and concepts. (p. 16)

Whitenack, 1963:

> Our task [as librarians] is simply to organize a system of recording and managing knowledge in relation to current flow. (p. 17)

Wright, 1976:

> Librarians are going to have to decide whether they are supposed to be the managers of knowledge (idea complexes) or of knowledge records (books, etc.). (p. 29)
> . . . .
> [Librarianship is] an insubstantial structure of formal order relationships, . . . [The] direct object of their [librarians'] concern constitutes the ultimate forms of the human mind itself. (p. 32)

Comments

The management of knowledge and the management of knowing are conflated

in some of these definitions. Where the intention is the management of human thought, the function is not logical to the librarian, and, indeed, is inappropriate for any individual or group to assume. Some uses of the notion of knowledge management refer to artifactual ordering and manipulation; these uses are logically within the domain of library science but do not adequately characterize the librarian's functioning with respect to recipients or users of the artifactual carriers of knowledge.

7. Definitions about Objects and People

The sets of definitions of library science in this section have as their principal emphasis the conjunction of things and persons. In these, functions of librarians are related to both content and recipients. In particular, persons are treated as ends in themselves and not as entities being acted upon and manipulated by librarians to produce cognitive or behavioral changes deemed to be "good" for them.

The following table presents the various definitional sets of generic terms and their corresponding synonyms.

TABLE 4

LIBRARY SCIENCE DEFINITIONS ABOUT OBJECTS AND PEOPLE

	Generic Terms	Synonymous Terms
7.1.	To make accessible	To make available have available render available arrange availability provide access gain access

TABLE 4--Continued

	Generic Terms	Synonymous Terms
		To obtain access
		allow access
		ensure access
		bring access
		give access
		enlarge access
		support access
		develop access
		maximize accessibility
		maximize exposure
		offer to
7.2.	To retrieve	
7.3.	To transfer	To distribute
		disseminate
		transmit
		transmit and inculcate
		facilitate transmission
		communicate
		facilitate communication
		communicate and digest
		convey
		diffuse
		funnel
		link or relay
		display
		promote
		aid flow
		maintain flow
		organize flow
		order flow
		facilitate flow
		pass along
7.4.	To supply	To deliver
		furnish
		provide
		minister
		send
		purvey
		satisfy
		help to find
		assist to find
		find
		help to locate
7.5.	To counsel	To diagnose
		diagnose and prescribe
		advise
		interpret
		help ameliorate
		help meet
		link

TABLE 4--Continued

	Generic Terms	Synonymous Terms
		To connect seek, record, and provide accept, understand, communicate, and collaborate
7.6.	To advocate	To negotiate resolve exploit advance
7.7.	To link	To connect switch interface mediate intermediate interrelate relate bring into contact bring together interact negotiate match facilitate interaction promote interaction bring to negotiate for bridge relay link, store, stretch, and control minister stand between to introduce effect contact seek to unite join change guide adapt and connect funnel hold together gatekeep select and supply operate a switchboard
7.8.	To use or maximize utility	To exploit facilitate use maximize use promote use render useful utilize digest encourage utilization

TABLE 4--Continued

	Generic Terms	Synonymous Terms
		To promote utilization maximize utilization develop utilization assist exploitation
7.9.	To interpret	
7.10.	To manage	To operate create, operate, and maintain maintain organize administer adjust archive manage flow
7.11.	To study	To analyze examine

7.1. Definitions about Objects and People: To make accessible

This set of definitions of the domain treats of access provision of various kinds of objects to people.

Jewett, 1853:

> [The purpose of librarianship is] the diffusion of a knowledge of good books, and enlarging the means of public access to them. (p. 582 in Thompson, 1931)

Rawski, 1973:

> Librarians engage in an *activity*, which has as its *goal* effective access to recorded knowledge as a *service* to those *seeking*, or expected to need, such access. This constitutes an organic system of activities involving knowledge records and services to people; and the intellectual and material equipment and know-how necessary in order to create conditions which promise to support, if not to optimize, effective access to recorded knowledge for those with a purpose of gaining such access.
> . . . .
> Charged with furnish to users knowledge records and knowledge based on knowledge records appropriate to the users' "notions," the librarian undertakes the *acquisition* (which in most instances includes selection); preservation; organization and housing as a collection; and making available of documents, i.e., objects made to record, store, display, and transmit knowledge. . . . [These are] *bibliothecal activities*. . . . (p. 127)

Williams, 1980:

> Society is increasingly dependent on widespread access to publications of the past and present. Libraries have proven to be the most practical means for collecting and preserving publications to provide this wide and continuing access. . . . If society is to have adequate access to information, now and in the future, librarians must change to recognize that the library's real purpose is to provide access to information and that the collection of an ever-larger number of publications by each library was but a means to accomplish that purpose--a means which is no longer possible. Librarians must now find effective means to assure the collection and preservation of publications they cannot acquire to keep in their own individual collections and to provide every library with fast and reliable access to these publications in conveniently readable form. (p. 58)
>
> . . . .
>
> The long history of libraries . . . clearly indicates that society has found libraries essential to the dissemination and preservation of information. This is what I take to be the fundamental purpose of libraries. (p. 69)

Comments

Accessibility or availability of objects to people would appear to be a potentially promising description of the librarian's functioning. See Chapters Three, Four, and Five for further treatment of this notion.

7.2. Definitions about Objects and People: To retrieve

This set of definitions is found much less frequently in the literature of library science than in the literature of information science.

Fairthorne, 1956:

> First of all, retrieval systems demand marks of some kind; entries on reference cards or lists or on the documents themselves. Someone has to make these marks--a hard fact which is sometimes overlooked. Marking can be done only by clerical operations on marked objects; . . .
>
> . . . .
>
> Or it can be changed relative to its environment by putting it upside down, on one side, in an inscribed pigeon-hold, and so forth. This I call 'ordering' the item. Better terms, for less formal contexts, are 'Marking' and 'Parking'. (p. 66)
>
> . . . .
>
> In the parts of Library Classification that can be delegated, these marks induce physical operations according to rules. If one is lucky,

according to rules that are complete, consistent, and appropriate. (p. 65)

. . . .

This much of document retrieval and, indeed, of library work in general has nothing to do with semantic content; only with observation, identification, and manipulation of marked objects according to fixed rules, or to fixed rules for constructing fixed rules.

In short, they are concerned with computing, but much more difficult and versatile computing than the ordinary kind. Hence the relative failure of self-acting hardware in library work.

Activities of the kind described I call 'Clerical' activities. They demand neither resource, discovery, initiative nor invention; only skill and reliability. Librarians need not be ashamed of them. You cannot delegate activities that demand anything more, and libraries exist mainly to delegate, without undue risk, certain kinds of intellectual work--whatever that may be. (p. 66)

Corrigan, 1968:

This writer has defined library science as information concerned "with creation, recording, transmission, storage, retrieval and use of information" [1967]. . . . Historically, we can view library science as an expanding subject. For many centuries we regarded ourselves as conservationists; later, we began to structure this act of conservation by the use of catalogues or other guides to what had been conserved. More recently we have become concerned with two aspects of use; the problem of retrieval of specific information from a large store, and the information gathering habits of specific classes of user. (p. 1)

. . . .

If one wanted a two word definition, perhaps storage and retrieval best covers the core of library science. Forget, for the moment, means, and concentrate on the basic similarity underlying every happy joining of an individual and necessary information, wherever this takes place. (p. 3)

Ingwersen, Johansen, and Timmermann, 1977:

We can relate cognitive processes to different persons playing four different roles in the storage and retrieval process.

1. The author-controlled organization of information in documents which is related to the broader organization of knowledge in general or within a discipline. (pp. 160-161)
2. The librarian-controlled bibliographic classification or indexing of material according to classification scheme or indexing system (also librarian-controlled).
3. The user who in some way interacts with the world around him and who decides to satisfy an information need by also interacting with the library system, either directly or indirectly, by approaching the reference librarian.
4. The reference librarian who aids in the transformation process from user concepts or structures into the organization of library material. (p. 161)

. . . .

(Ingwersen, Johansen, and Timmermann, 1977--continued)

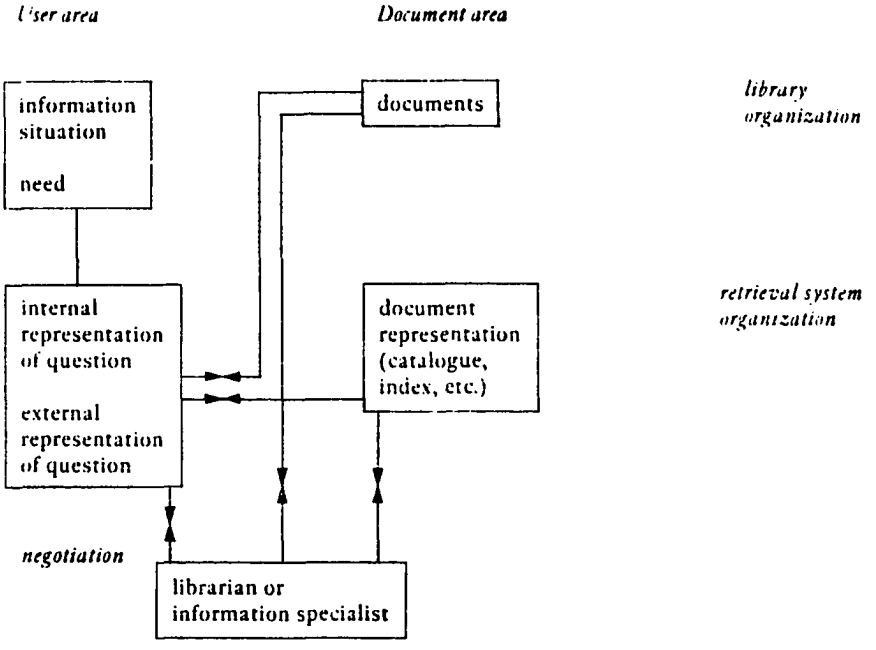


Figure 1. Human interaction with library stock and retrieval tools. (p. 161)

Comments

This set of definitions is evaluated extensively in Chapter Three, Sections 5.2. and 7.2.

7.3. Definitions about Objects and People: To transfer

Among the synonymous terms which form this generic set of definitions are the following expressions: to distribute, to disseminate, to transmit, to communicate, to convey, to diffuse, and to facilitate any of these actions including to facilitate flow.

Jewett, 1853:

> [The purpose of librarianship is] the diffusion of a knowledge of good books, and enlarging the means of public access to them. (p. 582 in Thompson, 1931)

Learned, 1924:

> The chief business of a community library is to produce a general diffusion of knowledge among small, ill-defined, and constantly shifting groups, where each need is peculiar to the individual himself, and must be dealt with separately. (p. 27)
> . . . .
> [The] free library, as a civic unit, is fitted, beyond any other institution that we possess, to undertake that task . . . as a positive educational instrument. . . . (p. 75)

Reynolds and Daniel, 1974:

> The ultimate objective of the communication process for librarianship is to facilitate the transmission of messages from sender to receiver. Within the library, the role of sender, or creator of the message, alternates between librarian and user, as does the role of receiver. Users generally adopt the sending role first in their origination of a request. The dialog that ensues between the user and the librarian involves a continual process of encoding and decoding messages that vary widely in complexity. The purpose of the dialog is to enable the librarian to interpret a request correctly and to provide an appropriate response from the multitude of information available in store. (p. 239)

Shields, 1981:

> The shift away from the vocational training toward the study of how society creates, maintains and uses facilities which provide information has been a long time coming. The realities of the future of higher education institutions, the library as an institution, and the societal *shift* to the use of information as a resource all point the way. And for those of us who cherish the idea of the library as a social agency wherein the individual can rise to find answers for self understanding, this is also the way to go. We made the decision in the 1930's that we were going to go the route of developing a discipline that would educate individuals capable of facilitating the flow of information. (p. 8)

Comments

This set of definitions does not serve to mark off a unique notion of the librarian's function. There are a wide variety of transferring, disseminating, and transmitting activities that occur outside the domain of library science. Moreover, there is confusion in the literature of library science with respect to the meaning of the term 'dissemination'. Benge (1970), for example, has equated it with 'use' or 'making available' of materials (see

Section 5.6. earlier in this chapter). This conflation of the concepts is inappropriate, although it and similar conceptual weaknesses appear to be widespread in the definitional literature.

In addition, with respect to transmission of knowledge, higher education has traditionally claimed this function as a primary one of its domain, and so cannot be claimed to be unique to library science.

The function of the librarian taken as transfer encompasses too much, because the action of the user or recipient is suppressed into that of being a passive receptacle.

7.4. Definitions about Objects and People: To supply

This set of definitions focuses on activities in which the librarian delivers, furnishes, or provides objects to people.

Wallace, 1876:

> [The] librarian, who had always stood between the author and his readers as a minister to letters, should now promote the scientific aspects of his craft. (paraphrased by Holley, 1976, p. 4)

Dana, 1906:

> Having found by telephone that the book, pamphlet, journal, catalog, quotation or what not is in the library, the inquirer should be able to have it quickly brought to him. Private enterprise delivers its goods; a public institution can well imitate this example as far as means permit. (p. 14)
>
> . . . .
>
> In time the organized special information work of a public library will be very great. . . . Private enterprises can clip you the notes you wish from a thousand journals as they appear. Surely a public institution . . . can furnish notes of books and articles on special subjects. (p. 15)

Wasserman, 1972:

> [A new conceptual scheme for librarianship] considers the library as the medium between the information store and its user. It accepts responsibility for identifying and delivering information needed by clients, instead of simply preparing the collection and offering help to

> clients as they search for themselves. (p. 228)
> . . . .
> If there is to be a new breed of librarianship, it will build on a perspective which sees in librarianship the capacity to satisfy the information requirements of human beings. (p. 267)

Harrod, 1977:

> Librarian. One who has the care of a library and its contents, selecting, the books, documents and non-book materials which comprise its stock, and providing information and loan services to meet the needs of its users. (p. 486)

Comments

This set of definitions suggests an immediacy of action in providing satisfaction, so that, for instance, someone other than a librarian might undertake this aspect of the process. The librarian's function is broader than that which is implied by the action of meeting a demand. Moreoever, there are supply functions with respect to artifacts, information, or knowledge which are performed by persons other than librarians, among whom are booksellers, publishers and distributors, newscasters and journalists, and public relations and press officers. These definitions frequently equate the notion of provision or supply of artifacts with the notion of provision of access to them; the first function signifies, however, a direct interaction, while the second signifies either a direct interaction or an intermediary condition of readying for eventual and anticipated access.

Thus, the notion of supplying or handing over is part of the function of the librarian but it does not focus on a broad enough domain of activity to encompass the whole of the function performed.

7.5. Definitions about Objects and People: To counsel

This set of definitions encompasses such terms as to diagnose and prescribe, to advise, and to ameliorate.

Henry, 1917:

> In this new insitution [of librarianship taken as self-directed education] the service is social, the problems vary as the individual tastes and experiences vary and the service must be sufficiently intelligent to diagnose the symptoms and prescribe a treatment. The problems of the present need the aid of all the past for light and guidance . . . and unto this end were books sent. (p. 79)
> . . . .
> Knowing what book to charge out and why, knowing the life and taste and needs of the patron and the community, and what book will serve is as much the profession as the most intelligent prescription or the finest surgery. (p. 87)

Hershfield, 1972:

> To help ameliorate these information problems [information deprivation, overload, and unmet needs], I wish to propose that we consider creating an information specialist called an "Information Counselor," and that librarians and would-be librarians prepare themselves to fill this role. (p. 30)
> . . . .
> Our practitioners must understand and concentrate on human information needs, human information seeking behavior, and the design and operation of information systems structured to serve different client groups. They will continue to be concerned with recorded materials, but their acquisition, organization, storage and retrieval of information resources will be dictated by their knowledge of and concern for human beings, rather than the acquisition and organization of materials as ends in themselves. Where information needs exist which cannot be satisfied with previously recorded material, our counselor will seek out the information, record it and provide it to the client in an appropriate form. The information counselor would see the community in which he practices as an information resource base. Such a community may or may not include a library as we know it.
> . . . .
> [Information counselors] would be professional information specialists, capable of linking clients with information in whatever form they might require. (p. 31)

Mathews, 1974:

> Librarians connect ideas and information drawn from all recorded knowledge with the needs of a single person.
> . . . .
> The librarian serves as both the doctor and the pharmacist to the mind and the senses, diagnosing and prescribing for the need, and filling the prescription as well. (p. x)

Comments

These definitions are largely metaphorical, deriving from medical or psychological analogies. The function of the librarian, however, is not precise characterization of mental states and in particular it is not determination of diseased mental states. The inquirer is more likely to be quite healthy rather than sick and to believe it to be so; thus, a medical functioning is ruled out since the healthy rarely consult doctors or psychologists. Similarly, the interest in reading motives and reading psychology is a matter for psychological inquiry, not a function of the librarian. Moreover, the conflation of counseling with linking, as exemplified in the Hershfield (1972) characterization, is logically incomplete.

7.6. Definitions about Objects and People: To advocate

This is a relatively minor set of definitions.

Wasserman, 1972:

> As the nature of information needs is distilled, the [new] reference librarian is better able to support user requirements and to exploit on their behalf a switching system which correlates information need with on-campus and off-campus information services. What is unique about such a design is the way it adapts the role of the reference librarian from detached bureaucratic functionary to a close and supportive relationship with clients. Seen thus, the client becomes a real human being needing prompt information access, and the reference librarian is recast in the role of sympathetic and client-committed staff member, knowledgeable about problem terms, not by virtue of single question negotiation, but through direct involvement and association with scholars and students. (p. 231)
>
> . . . .
>
> Traditional limits of library service have stopped at the point of attempting to match the user and the information sought. Advocacy . . . carries the professional role beyond, and enlists its expertise in the cause of advancing the needs of the client group first by pragmatically resolving their information problems and then extending beyond into other spheres. . . . [Community library services] are committed not to the classic library values of books and reading, but more nearly to serve as a mediating agent for the constituency by bringing intelligence, drawn from whatever source and in whatever form, to bear upon cultural requirements. If client need runs to specialized programs of the counsel

> of experts, or to the provision of informational or advisory assistance in resolving occupational, social, or economic problems, such problems are conceived to be within the framework of the advocacy responsibility of the librarian. Thus the information role transcends that of simply locating published sources and becomes one of negotiating the information structure in order to permit clientele, individually and collectively, to make their way and improve their condition in consequence of active intervention on their behalf of library personnel. In a complex time when information access forms a powerful and basic element of the urban problem-solving process, those not adequately sensitized or acculturated to the devices for finding the facts tend to be further disadvantaged and left without the means to negotiate the system. (pp. 231-232)

Shields, 1977:

> The librarian should be acting as an information transfer agent. The librarian must be allowed to fulfill an advocacy role in the utilization of information technology. If information is our infinite resource, then the ability to utilize the finite physical resources most assuredly depends upon information technology and the librarian. (pp. 75-76)
> . . . .
> [We] must recognize that it is becoming ever more important to be able to locate what it is you need to know than it is to gather data into the mind for possible future use. (p. 76)

Comments

Like the notion of counseling, an advocacy function is inappropriate for characterizing fully the domain of library science. Advocacy does not inhere to a particular functional agent, but is a term signifying general behavior in any sphere of human activity.

7.7. Definitions about Objects and People: To link

This set of definitions focuses on the function of bringing together. Synonymous terms are: to connect, to switch, to interface, to mediate, to match, to bridge, to relay, to join, to funnel, to gatekeep, to guide, and to unite.

Cotton des Houssayes, 1780:

> Neither cold nor heat, nor his multiplied occupations, will ever be to him a pretext for evading the obligation he has contracted to be a friendly and intelligent guide to all the scholars who may visit him. Forgetting himself, on the contrary, and laying aside all occupations, he will lead them forward with a cheerful interest, taking pleasure in introducing them to his library; he will examine with them all its parts and divisions; . . . Should a particular book appear to be even of passing interest to one of his guests, he will quickly seize the occasion, and obligingly place it at his service; he will even, moreover, have the delicate attention to lay open before him all the books relating to the same subject, in order to make his researches easier and more complete. (pp. 39-40)

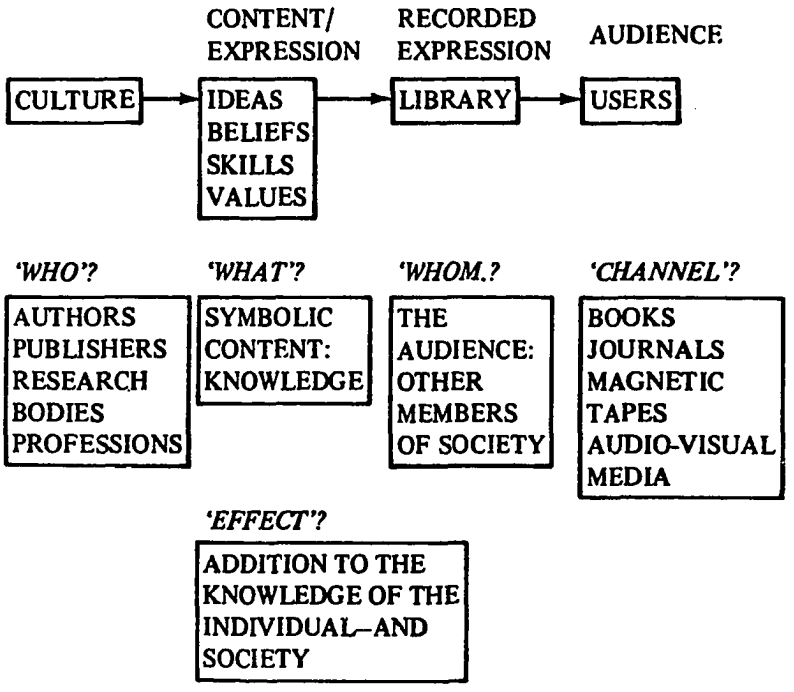
Putnam, 1915:

> In our reading public the hope of improvement lies, I believe, in the two influences I have mentioned: the freer direct contact with the books themselves . . . and increasing mediation between them and the reader by the librarian who, knowing them, relates them to the needs of the reader as a present-day human being. (p. 48)
>
> . . . .
>
> But the main guide must be the librarian himself, herself. The first contact should be with him, and so far as practicable, this should continue, until the final contact with the author has been assured. (pp. 48-49)

McGarry, 1975:

> Different men use different symbolic systems to investigate their own particular aspects of reality and consequently find difficulties in communicating with each other. Here at least would seem to be a chance for a new kind of librarian with a new social role as 'linkman'; the man with the overview, whose particular expertise is a kind of 'knowledge about knowledge'; who realises the degree to which the major disciplines of knowledge fragment and overlap each other. (p. 48)
>
> . . . .
>
> What is interesting is to attempt to analyse the role of *libraries* in the general sense of a social agency and *librarianship* in the sense of an active profession giving a service and *mediating* between the client and the library as information store. (p. 59)
>
> . . . .
>
> That which we call the social process--our daily activities of knowing, acting, believing and interacting with each other--depends upon the accumulation, transmission and diffusion of knowledge. But knowledge in turn depends upon communication, and in this way the library acts as a medium in the transmission process. (p. 61)
>
> . . . .
>
> The library as an information store is not an institution as such, but but rather an *agency* or *channel*. We can see the library in terms of Lasswell's communication model:

(McGarry, 1975--continued)



(p. 64)

. . . .

[The] function of the library changes, but in each case it is a channel or agency acting as a storage unit and means of diffusion. It can also act as a *source* with the librarian as mediator . . . between man and the graphic records. . . . (pp. 64-65)

. . . .

LIBRARY as INFORMATION STORE	LIBRARIAN as MEDIATOR	ENQUIRER as CLIENT

(p. 65)

Smith, 1980:

> The librarian chooses the codes in which to categorize information and arranges the key words through which information can be extracted. He now becomes a kind of author, and the author, in many ways, turns librarian. The librarian becomes, in a sense, the sentinel at the gateway of information and knowledge, and society may come to find itself demanding to see his credentials. (p. 314)

Comments

The function of librarian as a go-between or relay which is proposed in this set of definitions is accurate but does not achieve sufficient

precision. Mediator, intermediary, medium, means, channel, and the like are terms signifying instrumentality, but they encompass a universe that is too broadly drawn; the librarian is only one among many in this class of instrumental, intermediate agents. Moreover, the term 'to guide' signifies either leading or showing the way, or directing or determining the course of an action, event, or person. Since leading and directing are quite different concepts with respect to human beings, definitions using this term are ambiguous in intent.

Thus, this set of definitions does not serve to mark off the domain of library science from functions performed by other related but quite distinct linking agents.

7.8. Definitions about Objects and People: To use or maximize utility

In this set of definitions, the function of using or of maximizing usefulness is posited.

Bay, 1928:

> Library science must be accepted as the knowledge and skill by which printed or written records are recognized, collected, organized and utilized; the purpose of library science must be to associate its results with existing needs and demands; and the idea of library science should be human enlightenment in a historical continuity. (p. 449)

Kochen, 1973:

> Shera and Egan challenged the traditional concept of a library when they proposed that its function should be "to maximize the effective social utilization of the graphic records of civilization." (p. 188)
> . . . .
> Perhaps the Shera-Egan definition should be revised to: "to maximize the *greatest potentially attainable* effective and efficient social utilization of *documented knowledge*." Note that we also substituted the more abstract term "documented knowledge" for the "graphic records of civilization," to include non-graphic embodiments of documented--i.e., validated--truths, such as magnetic tape recordings. (p. 189)

Shera, 1980:

> The librarians talk glibly of library science, and indeed strive to endow it with scientific principles, but neglect the fact that librarianship has emerged from a humanistic tradition.
> . . . .
> [A] library in the sense one is concerned with here is an organization, a system designed to preserve and facilitate the use of graphic records. It is a social instrument created to form a link in the communication system that is essential to any society or culture. (p. 315)

Comments

In this set of definitions, 'utility' appears to be equated with 'utilization' and 'maximizing' is equated with 'promoting'. 'Utility', however, signifies 'usefulness', the quality or state of being useful, while 'utilization' signifies 'use', the action of utilizing or being utilized; usefulness and use are not identical concepts. The function of maximizing utility, therefore, goes beyond effective arrangement of objects and encompasses transformation into effective, practical forms. Such transformation constitutes the application of knowledge, in some instances, so that development inquiry is involved; this characterizes the function of applied researchers and developers. In other instances, maximal object usefulness would require unsolicited dissemination, for example, through publishers and distributors, or usage by other cultural agents, for example, teachers.

Another difficulty with this set of definitions is that the social is emphasized at the expense of the individual. The focus is on society and social benefit; how these relate to the person and personal benefit is an issue that remains unaddressed.

Finally, if the principal emphasis in these definitions were to be taken as maximizing utilization of objects, there is the remaining problem

of the unspecified nature of maximized utilization: what constitutes use and what would the librarian be engaged in while effecting maximized use? Rawski (1973, p. 127) has noted Shera's assertion elsewhere that the librarian's business is "effective access to recorded knowledge" (1963, p. 161). Clearly, use and usefulness are concepts quite distinguishable from the notion of access. Slamecka and Taube (1964) gave more precision by employing the phrase "implied anticipation of use":

> The essence of library service has been described in terms of its "custodial" and "interpretive" functions involving . . . the collection of certain records of human knowledge and work and their organization for storage and . . . implied anticipation of use of these materials, . . . (p. 64)

Moreover, some of the definitions conflate utilization with exploitation; they imply that exploiting by the librarian is the same as assisting by the librarian. This synonymity is inaccurate. The function of exploiting also signifies personal or, more frequently, selfish utilization of things or people. Finally the nature of the action with respect to an inquirer or recipient is not specified.

Thus, the function of the domain of library science as set forth in these definitions is conceptually ambiguous and vague.

7.9. Definitions about Objects and People: To interpret

This is a relatively infrequent focus in the definitional literature. Asheim, 1968:

> [The librarians unique task is] the ordering of knowledge and its dissemination and interpretation to users. (p. 1100)

Comments

This function is treated in depth in Section 7.10. of Chapter Three and in Sections 7.10. and 7.11. of Chapter Four.

7.10. Definitions about Objects and People: To manage

This set of definitions encompasses synonymous terms such as the following: to operate, to maintain, to organize, to administer, and to manage flow.

American Library Association, Board of Education for Librarianship, 1927:

> *Library science.* The body of organized knowledge which concerns the administration and management of libraries and their social relations. Preferred as a general term to "library economy" which as ordinarily used is confined to matters of technique. (p. 9)

Cassata, 1976:

> The functions of the librarian are not unlike those of the professional communicator, . . .
> . . . .
> Like other communicators, the librarian serves as a gatekeeper and a manager of information. (p. 215)
> . . . .
> Summarizing, the role of libraries and librarians in the communication process is something more than merely channels and keepers of hoarded information and knowledge. As selectors of books, librarians play the same role of gatekeeper as do newspaper editors or television producers who select their material from a vast store of material, . . . [Among] the library's most important functions are to complement the picture the mass media present of the world and to supply opinion leaders with information on all sides of the question. (p. 216)

Wilson, 1981:

> Shall we take the library out of library education?
> . . . .
> Is a librarian a cataloger, a bibliographer, an indexer, an online searcher, a person who answers questions, a storyteller, a program planner, an administrator? Is a librarian a congeries of technical skills or is a librarian something more? We will assume the latter position: A librarian is a specialist--a library expert, one who knows how to create, operate, and maintain libraries. A librarian understands that institution called a library, knows its place in society, and knows how to make it perform to meet society's expectations. (p. 322)

Comments

The management function is examined in detail in Chapters Three and Four.

7.11. Definitions about Objects and People: To study

This set of definitions focuses on the investigative function.

Lancour, 1951:

> What is the discipline of librarianship? In the broadest terms, it is the study of the library as a social institution in the performance of its educational function. (p. 361)

Klempner, 1976:

> [The new library school curriculum would] seek to study and analyze objectively the fundamental components and links within the total information transfer chain, i.e., from the producer of information to the consumer of information. (p. 413)

Wilkinson, 1980:

> Librarianship is that discipline which examines the relationships between information and user in the broadest sense of these terms; . . . (p. 151)

Comments

In these definitions, the function of the librarian is taken to be studying rather than doing. It is patent that a doing, a social practice, is not necessarily coterminous with the study required in order to become proficient in such a practice. This definitional set is examined in greater detail in Chapters Three and Four.

8. Summary Evaluation

This chapter has examined some 376 definitions purporting to describe the domain of library science. Twenty-two generic functions are identified for the librarian in this domain. These 22 functions are expressed by 270 synonymous, quasi-synonymous, and pseudo-synonymous terms.

Four general observations issue from the definitional literature reviewed here. These relate to: object of principal emphasis in the

definitions; the proper scope of the domain; the meanings of the basic concepts; and the citing tradition.

With respect to object of emphasis in the definitions, this ranges from the library and library collection, to books, publications, culture, information, knowledge, recorded knowledge, knowledge records, graphic records, and recorded discourse. There is no consensus in the literature on the proper object of study and practice. Ignoring metaphorical descriptions such as "the records of the human spirit" and so forth, it is imperative that theoreticians sort out the proper object of the domain of library science. It is patent that not all knowledge is recorded, that not all books are knowledge records, that not all culture is knowledge, that not all information is knowledge, that not all recorded culture is linguistic discourse, that not all recorded discourse is knowledge, that not all information is true (there is misinformation and false information), that not all culture serves to cultivate or enhance or ennoble the human being, that not all artifacts of a culture are linguistic, and that linguistic artifacts are of a different order of phenomena than information or knowledge. Moreover, the definitional literature has focused on a wide variety of other objects too: printed and written records; printed matter of all types; documents of every type and form; material in all fields of human knowledge; scientific and literary materials; recorded materials; recorded communications; reading matter; printed productions of the group; group culture and knowledge as recorded in printed materials; records of human knowledge; the literature on a subject; records of other men's thought, work, and experience; the whole of scholarship; information resources; what has been learned ("including what has been badly learned or mislearned"--Kaplan, 1964); the printed page including books, maps, and pictures; print; records (anything containing information); printed

works (products conveying men's knowledge, ideas, and experiences without direct individual contact consisting of printed or otherwise recorded verbal, mathematical and musical symbols); and, the social transcript.

Moreover, regardless of the designated object of study and practice for the domain of library science, the concept of a universe of instances of that object, the concept of a universe of discourse, is not extant in the definitional literature. As well, although selection by the librarian is almost always acknowledged, the selection is not described in terms of selection from a universe of discourse.

The second summary observation about the definitional literature relates to the proper scope of the domain of library science. Some definitions emphasize that it is the study of an object or of a process, while others emphasize that it is a practice, a doing. Some definitions limit the functioning of the librarian to the ordering of artifacts, such as their selection, preservation, cataloging, and classification. Others expand this functioning to encompass also interaction with inquirers. Still others have proposed a much broader scope, encompassing not only the care and use of artifacts by the librarian but also the production of the artifacts (Meyer, 1925, for example). Waples (1933) outlined the range of problems of library science as reading and readers, publications, and agencies for the distribution of reading matter. Winger (1961) included in the core of librarianship a study of the nature of knowledge and of the uses made of knowledge records. Kaplan (1964) held that the proper intellectual foundation of library science was a focus on information transmitting and processing behaviors and forms. Similarly, Hershfield (1973), among others, has proposed that library science study human information needs, human information seeking and processing behavior in different environments, and

appropriate information systems. Klempner (1976) called for the study of fundamental components and links within the total information transfer chain, from producer to consumer. Garrison (1977) included characteristics of all information handling activities.

The third summary observation about the definitional literature relates to the meanings of basic concepts. There is no consensus in the definitions about the meanings of a library, a book, the nature of knowledge, of communication, of information, of verbs describing the librarian's functioning, or of characteristics of persons served by the librarian.

The lack of definitional consensus is illustrated by the proliferation of terms to describe the librarian's functioning. A statement by Sharr (1970) illustrates the magnitude of this casual substitution of nomenclature:

> Librarianship is concerned with the interaction of people and ideas. It is, therefore, an aspect of education. The specific characteristic of librarianship within the larger field of education is the organization, or ordering, of information or the records of information: whether this is called cataloguing, information retrieval, search analysis, reference work, advising readers, or whatever. (p. 2)

Moreover, even the generic terms are used in the definitional literature as conceptual substitutes for each other, or as conjunctions, or as double noun terms. For example, in his theoretical model for the 1975 Intrex goal, Raymond (1965) used as synonyms or conflated the terms 'transfer', 'link', 'interaction', 'handling', 'retrieval', and 'dissemination' (see Appendix I, Section 7.3.).

Many of the descriptions in the definitional literature are lyrical and metaphorical rather than logically rigorous. Thus a library has been described as a pharmacy of medicine for the soul, as an intellectual treasury, as the sum total of all men's recorded ideas, as the memory of the race, as

the memory of civilization, as a cultural archives, as a cultural deposit, as the soul of the wise, as a community intelligence service, as a center of intelligence, as the people's college, as a school, as an educational institution, as an educational storehouse of knowledge, guidance and inspiration, as a laboratory for the mind, as a bureau of information, as a clearinghouse of live ideas and problems, as an organism, as the intellectual treasure of the community, and as the vault of knowledge. Similarly, a book has been described as a vehicle of knowledge, as an agent of the past, as an intellectual pharmacopoeia, as the medicine of the soul, as a record of the human spirit, as a structure in the imagination, as a quantity of knowledge done up in a parcel, as a social mechanism for preserving the racial memory, as the printed record of the race, as a storage battery of intellectual energy, as the image of some man's idea or idea complex, as a graphic record, as recorded knowledge, and as a social or cultural transcript.

The term 'knowledge' is rarely defined in this literature. Richardson (1927) described it as "the energy of personal life', as personality itself, as the image of the cosmos, of the universe of reality, of the universe in man (pp. 55-56). Nitecki (1968) defined knowledge as 'relations known' (p. 27). Shera (1961) recorded knowledge as synonymous with books. Ennis (1964a) proposed that:

> The word "knowledge" in the title of this paper will gradually transmute to the word "information," because . . . the word "information" is associatively more at home in this context [of professional and scientific uses of knowledge]. It is important, however, to note that man's printed record carries other associations; moral instruction and sustenance, imaginative release and recreation, individual and social solace and satire. The use and users of these aspects of recorded knowledge have not as yet been studied as intensively as have "information users". . . . (p. 17)

In a somewhat similar vein, Bryson (1970) observed:

> Note that the original term "communication" which was transposed to "information" has now become "materials." The logic of this is that materials contain the information which provides the communication. These materials are the carriers which Shera introduced. Perhaps the term "media" would be more appropriate. (p. 50)

Goode (1961) made the same semantic equations in writing of the flow of knowledge, the flow of information, and the flow of publications; these slippery conflations were not explicitly asserted, however, but only casually introduced.

The description of people served by the librarian also lacks consensus in the definitional literature. Human beings have been taken as a manifestation of energy, as knowing beings, as learning beings, as information processing entities, even as identical with information. People have been described as patrons, readers, users, the reading public, citizens, the public, the community, inquirers, borrowers, thinkers, scholars, the learned world, men of science, scientists, students, people, consumers, constituents, the masses, and information seekers.

It is because of the lack of consensus on basic concepts that many authors of definitional literature have conflated and confused elemental ideas from adjoining domains of critical inquiry and of practice, namely, from education, management studies, communication engineering, epistemology, sociology of knowledge, and political ethics. The unique functioning of the librarian is neither to teach, nor to manage, nor to undertake research, nor to politicize and socialize, nor to transmit physical signals. Shera (1972) argued that the generally accepted definition of the librarian's role is "actually no more than an enumeration of purposes for which books are used: education, information, recreation, aesthetic appreciation, and research" (pp. 358-359). As Egan (1956) pointed out, uses of books cannot be taken as identical with the functioning of the librarian, for their uses

inhere to them whether librarians are involved or not. This criticism applies equally to definitions which focus on effecting cognitive or behavioral changes in human beings, such as would result from the functioning of a teacher, a manager, a philosopher, a sociologist of knowledge, a scientist, a scholar, a physician, a politician (statesman, if you will), an entertainer, or a technologist.

It is because of these conceptual weaknesses, too, that the definitional literature treats the domain of library science as if it were a closed system in which librarians exercise direct influence on people, but people have neither choice in permitting influence nor in themselves influencing. The concept of the open system is missing. This weakness is addressed in Chapter Five.

In addition, this chapter has demonstrated that there are a vast number of synonymous terms used in the definitional literature to describe the librarian's functioning, the meanings of which are so closely related that there appears to be no rationale for the variations. Certainly, the authors themselves have rarely offered an analysis and justification for their choice of terms, nor have they compared extant terms and their diverse significations. These are definitions by assertion, rather than by logical and conceptual analysis. In many instances, they are ideological slogans and inappropriate analogies, such as likening the library to an organism; this is a biological analogy that equates the inert physical with the living entity, with the phenomenon of experience encompassing birth, growth, cessation of growth, maturation, and death.

This leads to the fourth summary observation about the definitional literature of library science, its citing tradition. The citing tradition is seen to be a frequently idiosyncratic fashion, with minimal acknowledgment

of the past literature. In addition, the original source of a definition is rarely acknowledged, and instead a later reference by a later, derivative author will be cited; for example, Landau (1958) and Irwin (1949) cited Danton's (1934) definition of library science, but they did not note, as he had been careful to do, that the original source of the quotation in question came from Bay (1928). Similarly, the great lexicographer Samuel Johnson's (1755) definitions of a librarian as 'one who has the care of a library' and of a library as 'a large collection of books, public or private' were widely used in the literature but almost never attributed to his monumental landmark *A Dictionary of the English Language*. This weak citing tradition is seen to be a major factor in the absence of a cumulative sense of domain conceptualization in the definitional literature of library science; stronger continuity with previous scholarship is a necessary, though of course not a sufficient, condition for such conceptual evolution.

This chapter has identified the principal conceptual emphases in the definitional literature. Two final observations are germane. The first concerns the role of metaphor in the formulation and definition of theoretical ideas. Nagel (1979) has outlined the conceptual complexities of metaphorical expression:

> The widespread use of metaphors, whether they are dead or alive, testifies to a pervasive human talent for finding resemblances between new experiences and familiar facts, so that what is novel is in consequence mastered by subsuming it under established distinctions. . . . [When] familiar notions are extended to novel subject matters on the basis of unanalyzed similarities, serious error can easily be committed. . . . Nonetheless, apprehensions of even vague similarities between the old and the new are often starting points for important advances in knowledge. When reflection becomes critically self-conscious, such apprehensions may come to be developed into carefully formulated analogies and hypotheses that can serve as fruitful instruments of systematic research. (p. 108)

The second observation of relevance here concerns the possible

conflation of quantity of definitions in the literature with their quality. The trends pointed to in this chapter are strictly enumerative, and any inference of qualitative adequacy which might be drawn from larger numbers of one instance over another would be entirely fallacious. The logic of definition does not issue from repetition alone.

It is possible that a logically adequate definition of the domain of library science exists in the literature, but if it does, it has never been cited, and so has not been uncovered in the present study.

CHAPTER THREE

DEFINITIONS OF INFORMATION SCIENCE

1. The Published Literature

1.1 Overview

Like the theoretical literature of library science, the theoretical literature of information science suffers from inadequate bibliographic control. Wellisch (1972) noted that the index to *American Documentation* did not begin to show the term 'information science' until five or six years after its first appearance in the professional literature; indeed, there was no subject index at all prior to the 1961-1964 cumulative index. He wrote:

> Thus the very same people who for more than ten years had tried to devise all manner of sophisticated gadgets for 'information retrieval', and who looked down on lowly old-fashioned librarians and indexers, did not find it necessary to provide even the simplest retrieval tool to their own ideas, and when they finally got around to do so, they botched up the job miserably. (footnote, p. 163).

Although there is a good deal of lip-service in the literature of information science to the importance of theory, no review article in the *Annual Review of Information Science and Technology*, from the first volume in 1966 to the most recent one in 1981, has contained the term 'theory' in its title; nor have the terms 'terminology', 'definition', 'discipline', 'domain', or 'model' been used in the titles. Poole (1979) observed that:

> The importance of theory to information scientists and the lack of it in the literature of the discipline is easily discernible from the most superficial review. A search through the pages of all the volumes of the *Proceedings of the American Documentation Institute*, the *Proceedings* of its successor, the American Society for Information Science, the *Aslib Proceedings* as well as of the indexes of *Library Literature* and *Library and Information Science Abstracts* through more than the past twenty years, as well as *Documentation Abstracts/Information Science Abstracts* since its inception in 1966, reveals few articles on the topic, and most that do exist are exhortatory in nature at best. The monographic literature of information science is replete with statements such as. 'Thus we have portrayed what may be the current state of theory in information science,' but search through such volumes as one will, one must conclude that (a) either there is no theory, or, (b) if it exists, it has still to be identified. (p. 15)

He noted that "information science lacks a body of published theoretical research" (p. 11). Further, there has been little theoretical work at the doctoral level. Important beginnings are the dissertations produced by Booth and Wadsworth (1960), Saracevic (1970a), Rathswohl (1973), Belkin (1977), Poole (1979), and An (1980).

A number of "key paper" collections have been published over the past twenty years. Of these, Saracevic (1970) and Griffith (1980) are the most comprehensive contributions, but even these provide only cursory treatment of the definition of the domain of information science. A useful reference work is the collection by Basova, Chernyi, and Sviridov (1974) of abstracts of some 311 of the most well-known papers in more than fifteen languages, on the theoretical foundations of information science.

Critical reviews of early definitions of information science are Mikhailov, Chernyi, and Gilyarevski (1967), Goffman (1970), Wellisch (1972), Cook (1976), and Belkin (1978). The most comprehensive international review is by Dembowska (1968), who surveys not only

English and Russian literature but the German and Polish as well. Belkin (1975) has provided a short review of selected Soviet concepts and a brief bibliography. The most advanced theoretical contributions have been produced by the Committee on Terminology of Information and Documentation and by the Committee on Research on the Theoretical Basis of Information, sponsored by the International Federation for Documentation and published by the All-Union Institute of Scientific and Technical Information in Moscow.

There have been a few published attempts at grouping the extant definitional literature. Hayes (1969) categorized the various views of information science education according to their focus on: the use of computers in libraries; science information; computer science; engineering communication theory; specialized information system design and application; an autonomous discipline. Samuelson (1972) categorized the theories of information science according to the number of components of information science which were included; the components were asserted to be: environment, sensing, informative, diagnostic, purpose, action, result, goal, and ultimate objective. Vagianos (1972) grouped the views of information science as emphasizing its nature as: a social or natural science, a theoretical science, a metascience, a technological profession, or non-existent. Wersig and Neveling (1975) classified the literature into the following categories: those treating information as a phenomenon; those treating information as a means; those emphasizing the field as a technology; and those focusing on purpose.

Although these previous taxonomies may be considered fruitful

advances over de novo theorizing and ex cathedra defining, the various categories which have been suggested suffer from excessive overlapping, so that it is not possible to make logical distinctions between them; for example, in the Wersig and Neveling taxonomy, technology is a means and it is also a phenomenon.

There are at least three types of information science literature which have served to hamper the theoretical development of the field. The first of these is the published list of titles. Pope (1975) for instance, noted that A Bibliography of Information Science and Technology, considered the most comprehensive bibliography yet available, did not specify the criteria for including particular works. "That criteria existed and were applied in a consistent fashion by the compilers of the bibliography is an assumption," he observed (p. 208). Although he considered such an assumption to be a reasonable one, it must be pointed out that logical analysis can not proceed on the basis of unstated assumptions; the onus is on the author to lay out his or her reasoning so that the logic of such reasoning can be evaluated and verified by others, for silent logic is private and not public.

The second type of inhibiting literature in information science has been the plethora of surveys of curricula, none of which has been based firmly on an adequate definition of the intended domain. To illustrate the slippery conceptualization which inevitably ensues from weak or absent definition, Isabella (1964) reported a survey of present and proposed information science content of library school curricula in order to determine their adequacy "for the

preparation of science information personnel for work in the field" (p. 67); in this survey, the terms science information and information science were used interchangeably, strongly implying reference to a single concept.

The third type of inhibiting literature is the recent appearance of bibliometric anaylses, notably those by Marshakova (1981), Small (1981), and White and Griffith (1981). None of these began with a stated definition of the domain, and yet each purported to identify the field of information science by quantitative analysis of its literature. Small marked off a set of information science journals by listing his own selection of fifty titles. Without a theoretical framework, however, such an activity is merely idiosyncratic. To demonstrate this idiosyncrasy, it might be pointed out that the list of the alleged fifty contains such "information science" journals as College and Research Libraries, IEEE Transactions on Engineering Management, Journal of Librarianship, Library Trends, Library Quarterly, Pattern Recognition, Social Studies of Science, Special Libraries, Unesco Bulletin for Libraries, and Wilson Library Bulletin (pp. 41-42). It is ironic that Small criticized as "somewhat idiosyncratic" the choice of journals in the earlier effort by Donohue (1972) to conduct a bibliometric analysis of the information science literature, singling out as an example the inclusion of the Journal of the Acoustical Society of America.

These types of literature have constituted inadequate scholarship in information science, for the withholding of definitions has served to withhold the reasoning from which research and conclusions

issued and to prevent the judging of scholarly merit of that reasoning and those claims by peers.

1.2 Definitions

Almost 700 definitions of information science and its antecedents are examined in this chapter from the English-language press between 1900 and 1981. Like the definitional literature of library science, the definition of the domain and essence of information science remains elusive; there is no sense of conceptual evolution. Unlike the conceptual inertia that characterize the identity of library science, however, the literature of information science is characterized by conceptual chaos.

This conceptual chaos issues from a variety of problems in the definitional literature of information science: uncritical citing of previous definitions; conflation of study and practice; obsessive claims to scientific status; a narrow view of technology; disregard for literature without the science or technology label; inappropriate analogies; circular definition; and, the multiplicity of vague, contradictory, and sometimes bizarre notions of the nature of the term 'information'.

Although the definitional literature of information science is characterized by greater citing activity than that of library science, most of the citing is repetitious and uncritical; there is little analysis of the adequacy of the cited statements. The previous work is simply taken at face value, and thus a chain of weakly-founded

concepts in the literature is found to emerge. A partial explanation for this superficial acknowledgment of previous theorizing is suggested by the disproportionate number of definitional papers presented by annual meetings of definitional papers presented to or produced by annual meetings of professional associations and by conferences; at such gatherings, personality, group conformity, and time are more crucial factors than demonstration of the logical adequacy of claims, assertions, and assumptions. Furthermore, the weight of numbers has no weight at all in the determination of logical merit.

A second problem contributing to conceptual chaos in the definitional literature of information science is the conflation of study and practice. For example, many descriptions of the domain state that it is both the study and the practice of information generation; but the actual generating of information is what a researcher or an author does, so that such a domain would include at least all of science, the humanities, the arts, and journalism. The study of phenomena, ideas, and practices must be distinguished from acting and doing. A similar logical weakness characterizes definitions which claim that the domain includes both the study and the practice of information utilization. Using information is the function of the user or consumer. The conflating of study and practice are complicated further by syntactical vagueries such as "information science is concerned with. . . ." Such a phrase has no significant meaning.

Another problem in this literature is the obsessive claims to scientific status. As the library science literature has been obsessed with professionalism, so the information science literature

has been obsessed with science. Indeed, most of the definitional literature is devoted to defending and arguing the claim to scientific status, rather than to elaborating the nature of the domain. Much of the problem issues from a confusion of science and quantification: that if something is to be studied scientifically, it must be measurable, and if it can not be measured, it can not be the object of a science. This is a naive form of logical positivism. These thrusts are misguided and unproductive. The focus should be on the specification of a body of social problems, and on the delineation of the logically separate dimensions of the problems into their scientific, praxiological, and philosophical aspects. Social problems can be about what is, about effective means, and about what is good. The definitional literature has merged these logically distinct dimensions of the social into the scientific, but the scientific dimension is the study of what is, not of what is instrumentally good or of what ought to be. Axiological study, which results in description of value, must not be conflated and confused with scientific study, which results in descriptions of empirical phenomena. Along similar lines, there has also been a tendency in the definitional literature to take the physical sciences as the scientific model rather than the human sciences, and so the phenomena of the domain are frequently limited to physical manifestations.

Related to the obsession with scientific status is the narrow view of technology or applied science represented in the definitional literature. Technology or applied science is taken to be related to empirical phenomena, the application of science to human problems. This conceptualization is entirely inadequate, for the human being has

reasons for doing certain things rather than others, and for doing them in certain ways rather than in others. The questions of worthwhile objectives and worthwhile means must be considered on grounds other than mere technological feasibility. The narrow view that applied science denotes only the study of how to apply science, is similarly flawed; means and ends are equated. However, a more adequate view of means and ends is that they must be rationally defensible, and therefore the concept of applied science can not encompass both the study of what is and the study of what ought to be. Also, technology is typically taken as hardware, which is merely the physical manifestation of actual human activity. Similarly, technique is inappropriate because it is taken too narrowly as routine or algorithm. Applications of science go beyond science, beyond the description of what is real in the world. To conflate science and its application is to hold that everything real is worthy of emulation and imitation; but the appeal to what is gives no guidance whatever to the problems of what ought to be or how to achieve it effectively. These latter problems are questions of value, axiological issues of the most profound complexity.

Another problem in the definitional literature of information science is the disregard for literature that does not have the science or technology label. Various writers have noted this exclusive focus of the literature and indeed many of the definitions have specified the domain as limited to scientific and technical information; lately this has been enlarged to encompass business or management information. A further complication in such definitions is the confusion about whether the information is the input to some activity or its output;

for example, the term 'scientific information' does not specify whether the information is that which is needed in order to do science, or that which is the product of doing science. These kinds of information are quite different, yet typically the two are conflated. This is made clearer by reference to the term 'management information' which is always taken to mean input information required by management in order to make decisions or solve problems.

In addition to the contribution of the above factors to the conceptual chaos in the definitional literature of information science, there is the problem of the use of inappropriate analcgies. One such analogy has already been mentioned, the unexamined assumption that the concept of information can be treated like physical concepts in the physical science. There are two more serious abuses, however. One of these is anthropomorphism and the other is its opposite, mechanistic reductionism, which in this literature typically takes the form of computerism. An instance of the former logical weakness is the following statement by Kochen (1965):

> In concrete terms, an institution, like Harvard, is here viewed as a living organism. The three functions of its information system may be embodied in 1) the total understanding within the entire Harvard intellectual community, 2) the Harvard library system, 3) the actual community of scholars affiliated with the university. (p. 42)

Although the treatment of social institutions as living organisms is a logical fallacy more frequently associated with the literature of library science, there is one pervasive usage in the definitional literature of information science, namely the promiscuous usage of the notion of information to describe not only verbal transactions between persons but also neural transactions within the human brain, sensory transactions between animals, chemical transactions between

and within cells, and even occasionally physical transactions between inanimate objects. Hayes (1969) has put forth this essentially reductionist view:

> That a social system or biological system can be regarded as an "information system" may seem somewhat unnatural, at least in the sense we will use here. But it is clear that each performs processes upon what we can regard as data (symbolic representations). For example, an elected official can be treated as a symbol of his constituency. There are clearly defined mechanisms for selection of such symbols and these constitute "information-generating processes." Similarly, the "genetic code" is simply arrays of amino acids, but these can be regarded as data (symbolic representation). Economics is concerned with processes upon symbols or capital; psychology, with processes upon symbols of response, etc.
>
> Each of these is therefore a proper domain for information science to study. (p. 365)

Brookes (1974) held that:

> [Even] primitive unicellular organisms were able to process information. Their 'thoughts' were restricted to the recurrent question: Is this particle which has just touched me edible or not?--the basic Shannon information system limited to two possible discrete signals. (p. 120)

Fairthorne (1969) criticized this conflation of concepts:

> To call the collision of one stone with another stone a 'transfer of information' is gross anthropomorphism that grossly misleads. In no useful sense is the one stone informing the other about anything. Whether the collision informs an observer depends upon what the observer wishes to be informed about, what he can observe, and whether there is an observer. (p. 26)

After the third advanced study institute in information science sponsored by NATO in 1978, Machlup (1979) registered a similar criticism:

> Some of our speakers commit the fallacy of misplaced metaphorization in applying the notion of information to processes that activate organic matter, such as cells, organs, and organisms. (My reference is to Miller's Living Systems.) In the case of animals we may be justified, and perhaps even right, in attributing to them what we call intelligence in our discussions of human action. Animals may well possess the capability of receiving and transmitting information in the same or similar ways as human beings do. But since we are

> not sure about this, or not yet quite sure, it is more cautious for us to concentrate chiefly on studies of human intelligence and interpersonal transfers of knowledge. To treat nonhuman matter or organisms as if they were thinking men is to commit the often decried fallacy of anthromorphism (also called the anthropopathetic or, after Ruskin, pathetic fallacy). To treat or explain human action as if it were determined exclusively by physical or physiological forces is the opposite and equally infelicitous fallacy or dehumanized, unwilled determinism of voluntaristic decisions. (Sir Karl Popper spoke of "the nightmare of the physical determinist" and of the belief in "masterswitch theories" of human decision making.) The point at issue is the intercession of consciousness in the explanation of human thought processes, an intercession that would serve no good purpose in the explanation of physical, chemical, and physiological processes. (pp. 112-113)

The logical fallacy of computerism is more sinister. Griffith (1980) has emphasized, for example, that "nearly everything people do, can be done with a machine" (p. 345, italics in original). Another extreme example of mechanistic reductionism is the argument by Gorn (1967) that any organism can be studied as a communication and control system, including men and machines, and "that they therefore subsume such entities as families, ethnic groups, armies, corporations, and even systems such as technologies, cultures, files of information, disciplines of knowledge, languages, and educational systems in both a narrow and a broad sense. . . ." (p. 439). Hays (1971) suggested that:

> [If] a computer can take part in a conversation, it must have a supply of little tiny theories, and a method for applying some of them. Tell it some facts, and it can riffle its pack of explanatory principles, suggesting some that might explain --that is, give a unified account of--the facts. A machine that could do that much would become a colleague, possibly interesting to discuss problems with.
> . . . .
> If the machine can weld together a community by keeping their factual information up to date; if it can test for consistency among theories; if it can suggest new theoretical explanations --and a metalinguistic machine should ultimately be capable of all those acts--then it is a philosophical machine. (p. 7)

In a similar vein, Slamecka (1967) argued that:

> Now if you accept a hypothesis of mine--that most of "new" knowledge is generated by the application of existing or modified methods to new sets of problems it is theoretically possible--once the structuring relations of information are understood--to generate new knowledge by information processing automata. My hypothesis identifies the method as the moving force of science and of knowledge growth, and it is not difficult to imagine information processing systems and mechanisms having an algorithmic capability of fostering an interation [sic] of methods and problems. With a repertoire of logical and mathematical aids programmed into it, such systems would automatically seek out methods likely useful to the solution of given problems, and proceed to solve them using these aids. (p. 6)

It is difficult to determine whether such views argue for personified machines or mechanized persons. A similar confusion issues from the notion of "man-machine communication". Veehnuis (1971) has perceptively observed that: "In practically no situation is a human being communicating with a computer. Sometimes he is trying to get an answer on a specific question, . . ." (p. 333).

Fairthorne (1969) has noted:

> At the other extreme from purely physical phenomena, it is equally misleading to use informational terms for private processes in an individual brain or mind. A private language is not a language. It is just a correspondence of stimuli and responses of which the individual can never be wholly conscious. . . . Language is not a private matter, but essentially public.
>
> Neglect of this distinction leads to false analogies between libraries, computer stores, and organic brains. No one has yet established any meaningful analogy between the social use of libraries and computer systems to obtain access to records, and what is known as 'memory and perception' within a self-subsistent entity. Certainly no 'brain model' of document retrieval can be at the same time a valid model of a brain and a valid model of document retrieval. (p. 27)

Whatever the form of the logical fallacy, gross anthropomorphism or mechanistic reductionism, the result is the same: a major obstacle to theory building. This obstacle is what Thayer (1963) described as "conceptual slippage", that is, the use of one level or

order of analysis to explain or predict at another level or order, or to refer to phenomena at different levels of complexity by the same term. He argued that a theory of biological information processing, for example, must be based on biological laws, that a theory of human information processing must be based on psychological laws, and a theory of social information processing on sociological laws. We "cannot approach conceptually different phenomena with the same set of metatheoretical assumptions. We need to ask what sorts of assumptions at each level will facilitate our theorizing at that level" (p. 224).

A further illustration of the logical error inherent in this sort of conceptual slippage is the following assertion by Levitan (1981):

> Libraries, publishing companies, and laboratories--all traditional information agents--will continue to create, collect, store, convert, retrieve, disseminate, and regenerate and use information. Each information agent is an information system with information for its input and output. (p. 13)

To equate the functioning of librarians, publishers, and laboratory researchers as identical is to conflate logically distinct practices, and to equate further not only all outputs as identical and not only all inputs as identical, but all outputs and all inputs also as identical is to misconceptualize on a grand scale. In such a characterization, the term 'information' denotes so many different notions that its meaning is diluted beyond recognition. The same logical weakness is evident in Orr (1970):

> [The] scientist is depicted as an information processor with only two basic sources of input--his own observations of nature . . . and information generated by others, living and dead, . . . (p. 145)

Again, the problem is conceptual slippage, the new reductionism in the definitional literature of information science.

One other illustration of conceptual slippage is noted, one that is both logically inadequate and gaining in scholarly prominence, particularly among economists. This is the notion of the information economy. Porat (1977) developed an elaborate classification of "information activities" on the basis of the following definitions:

> Information is data that have been organized and communicated. The information activity includes all the resources consumed in producing, processing and distributing information goods and services.
>
> . . . .
>
> The operational definition of information used in this study goes beyond the narrow definition offered above, encompassing all the workers, machinery, goods and services that are employed in processing, manipulating or transmitting information. The telephone, the computer, the printing press, the calculator, the manager, the secretary and the programmer--these are all essential members of the information activity. (p. 2)

Porat did not, however, provide this "operational definition" of information which nonetheless furnished the foundation for the ensuing elaborate classification and quantification of the American economy. He noted that many different types of information workers could be identified:

> We find the research scientist, engineer, designer, draftsman, manager, secretary, clerk, accountant, lawyer, advertising manager, communications officer, personnel director--all essentially paid to create knowledge, communicate ideas, process information--in one way or another transform symbols from one form to another. (p. 3)

Using such a reductionist approach, it is not surprising that Porat found that the total information activity accounted in 1967 for 46 per cent of the U.S. gross national product and that over 53 per cent of all labor income in that year was earned by information workers

(p. 8). "These major findings," he concluded, "motivate the argument that the U.S. has now emerged as an information-based economy" (p. 8).

Among the information workers so classified are to be found the following:

1) Knowledge producers: all scientists, mathematicians, statisticians, research workers, engineers, counsellors and advisors, lawyers, foresters, conservationists, judges, personnel labor relations, architects, therapists, dietitians, physicians (50% of their compensation), designers, draftsmen, social workers, computer programmers, financial specialists, accountants, bank and financial managers, actuaries;

2) Knowledge distributors: all teachers in all areas, coaches (50%), librarians, archivists, writers, artists, entertainers, editors and reporters, photographers, authors, public relations people and writers, radio and television announcers;

3) Market search and coordination specialists: enumerators and interviewers, estimators, investigators, inspectors, real estate appraisers, insurance adjusters, meter readers, weighers, surveyors, bill collectors, buyers, shippers, purchasing agents and buyers, insurance agents, brokers, real estate agents, stock and bond salesmen, auctioneers, advertising agents and salesmen, sales representatives, sales managers, demonstrators, salesmen (50%), officials and administrators, office managers, foremen (50%), ship officers (50%), clerical supervisors, postmasters and mail superintendents, health administrators, vehicle dispatchers and starters, production controllers and expeditors, air traffic controllers, time keeping clerks and payroll clerks. (pp. 108-113)

These conceptual leaps are made by theorizers who are apparently unaware of the vast logical chasms below.

A further factor in the conceptual chaos issuing from the definitional literature of information science relates to the frequency of circular defining. A statement such as "information science is the science of information" constitutes an incomplete and uninformative definition; to this is typically added the observation

that "information is difficult to define", that it is "a fundamental phenomenon", that it is "a fundamental property of matter", or that it is "a form of metaenergy". Thus these theorizers would leave the focus of their domain undefined, and so undetectable and unknowable. The result is a domain of study of nothing at all.

Many of the above factors contribute to the last major problem in the definitional literature: the multiplicity of vague, contradictory, and sometimes bizarre notions of the nature of information. Nauta (1972) surveyed the major notions of information. An editorial in the first issue in 1975 of the International Forum for Information and Documentation summarized the conceptual chaos in its title "Let Us Speak One Language". It said:

> Information is regarded either as a property peculiar to living beings (and cybernetic devices), or as a universal property of all matter. A variety of dichotomic divisions of this concept are suggested: objective-subjective, biological-social, control-related-other, potential-actual, ante factum-post factum, etc. To measure information quantity, the probabilistic, dynamic, algorithmic, combinatorial, topological and other approaches are used. As regards assessing the content or value of information, so far no reliable criteria have been developed.
>
> Here are a few typical definitions of this concept: negative entropy; resolved uncertainty; that which modifies our knowledge; reflected variety; reflection activity measure; metaenergy. This short list alone suggests the vagueness of the notion and the futility of attempts to embrace it by a single definition, at least at our present level of knowledge.
>
> As for a working definition of "information" as the basic object of our science, the picture confronting us has almost the same diversity. We find "information", "documents", "texts", "data", "facts", "knowledge", "scientific information", "scientific and technical information", "scientific, technical and economic information", and "specialised information"--and this is a far from complete list of the terms found in scientific papers and the names of institutions. Misunderstandings are frequent where there is uncertainty as to what kind of information is being discussed. The most radical authors propose to eliminate from scientific discourse the term "information" with all its derivatives! (pp. 42-43)

The proliferation of notions of information in the definitional literature of information science staggers the mind. Information has been taken to be synonymous with any one or more of the following 134 variant notions:

- knowledge
- recorded or communicated knowledge
- knowledge in commicable form
- knowledge of a factual kind
- scientific knowledge
- scientific and technical knowledge
- scientific, technical, and artistic knowledge
- a vehicle for the transfer of knowledge
- the building block of knowledge
- an increment of knowledge
- the increase of knowledge by communication
- the written or spoken surrogate of knowledge
- increasing the state of knowledge of a recipient
- the raw material for knowledge
- an anomalous state of knowledge
- the state of knowing
- the process of knowing
- the product of some basic process of inquiry
- something that changes a person's state of knowledge
- a subset of the sum total of knowledge
- knowledge and opinion
- knowledge, opinion, and ideas
- discoveries

- new knowledge
- knowledge not previously known to its receiver
- knowledge or instruction acquired by the receiver through processed data
- understanding
- enlightenment
- intelligence
- recorded knowledge and intelligence
- wisdom
- fact or facts
- facts about any subject
- any facts or data which can be used, transferred, or communicated
- facts being communicated
- the process of communicating facts or concepts in order to increase knowledge
- data
- data recorded, classified, organized, related or interpreted within context to convey meaning
- recorded data
- the raw material consisting of a mere collection of data
- raw data
- the meaning or content of data
- the meaning assigned to data by known convention or conventions
- the meaning assigned to data by the known conventions used in its representation
- transformation of data
- processed data or facts
- processed and evaluated data
- the data which results from a process upon data

- structured data
- a collection of facts or other data especially as derived from the processing of data
- meaningful combinations of data
- an aggregation of data
- data with some ascribed value
- useful data
- data of value in decision-making
- broader than data
- something to be used in decision-making, planning and problem-solving
- any kind of knowledge or message than can be used to improve or make possible a decision or action
- ideas
- ideas, opinions, speculations
- news
- message content
- a message used to represent a fact or concept by the unity of a data medium and its meaning
- a name for the content of what is exchanged with the outer world as we adjust to it
- the semantic content of a message
- the objective content of the link between interacting persons
- the objective content of the link between interacting material objects, which reveals itself in the transformed status of these objects
- meaningful reference
- the meaning contained in a stored item
- the meaning of a sign
- sets of symbols that specifically indicate one out of a number of alternatives

- pattern recognition
- a relational concept
- transforming the structure of the recipient's image
- a unit of thought
- the change in the mind of people
- the act of informing
- the process of becoming informed
- a logical quantity of summation of relations between terms
- novelty
- communication
- a communication process with a specific purpose
- that which justifies representational activity
- that which adds to a representation
- that which alters representations
- that which adds to or changes a representation of what is known or believed to be known
- any form of representations or surrogates of knowledge or a particular thought
- recorded marks
- interpretation of external stimuli
- the stimulus perceived through our senses
- perception
- change in perception
- sensory stimulation
- consciousness
- the summation of man's experience
- the basis for purposeful activity
- an essential ingredient in decision-making

- an essential ingredient in all production processes
- the essential ingredient of any control system
- a certain power to manipulate and control our lives
- a technique for maintaining a certain status quo
- a process in the mind by which a problem and useful data are brought into productive union
- the mental process of problem-solving
- uncertainty
- reduction of uncertainty
- resolution of uncertainty
- a process and a product of the human brain and senses which have the potential to reduce uncertainty within a parameter or limit
- a measure of the net value obtained from matching the elements of a present problem with appropriate elements of data
- that which holds society together
- culture
- an environment
- a result of the interaction of a system with its environment
- a commodity
- a product
- a saleable product
- a stored item
- a resource
- a basic resource
- a form of metaenergy
- superenergy for the brain
- a basic entity of the universe
- a mathematical function applied to stored codes

- a relative quantity definable only in terms of a specific situation with a specific set of observable actions
- a fundamental phenomenon
- a social process
- a human process
- a psychological process
- a physical process
- a biological process
- a chemical process
- a neural process
- all life.

This proliferation demonstrates the conceptual chaos issuing from the definitional literature of information science. Auerbach (1972) noted at an advanced study institute on information science sponsored by the North Atlantic Treaty Organization that:

> I have listened with great care to all the fine speakers who have given very different concepts for the word information--and yet each of them has agreed that all the others are correct! What is even more confusing is that they have sometimes incorporated these conflicting definitions within their own. (p. 217)

He argued that an effort be made to define fundamental concepts and that a few words be banned, "the first being information" (p. 219).

There are a few observations that can be made about the notions cited above. First of all, none of them mentions misinformation, whether intentional or unintentional; lies, propaganda, misrepresentation, gossip, delusion, hallucination, illusion, mistake, concealment, distortion, embellishment, innuendo, deception--all these results in some form of other of misinformation. However, all the above notions of information rule out the possibility of negative information.

This constitutes a serious logical weakness in conceptualization. One of the few serious efforts to account for negative information and miscommunication is a paper by Crane and Bernier (1958).

Another observation about the above notions of information is that many of them are based on a naive model of "information man", which sometimes takes the form of decision-making man or uncertainty man. This model assumes that the human being is a one-dimensional figure and that this dimension is restricted to the cognitive; emotion and intentionality are suppressed in such a model, and only the rational is seen to exist. How such a narrow conceptualization of the human being can explain the large amounts of human behavior and the human condition that derive from tradition, tenacity, custom, authority, faith, loyalty, ideologies, curiosity, imagination, altruism, creativity, sacrifice, love, hate, and habit is a question that is never addressed. In this simplistic model of information man, for instance, there is no recognition of the frequent situations in which increments of information increase uncertainty, rather than reduce or dispel it. As Roberts (1976) observed:

> The underlying assumption appears to be that increments to human stores of information are, like separate bricks, added to the top layer of existing information structures. Receptivity, manipulation and other complex contributions to the information process are ignored as are the doubts that must arise from the unstated assumption that the process of information acquisition is a function of a perceived, specific, personal uncertainty.
>
> . . . .
>
> Information inputs are not simply acquired, they are assessed, accepted, or rejected, related, manipulated, and, perhaps, acted upon in varying fashions depending upon experimental and other personal factors. (p. 252)

Vagianos (1972) observed that, while information is a fashionable term at the present time, "no one has provided conclusive

evidence which delineates how much information, what kind, in what format, and of what quality is needed." The reason, he argued, is simple:

> The transition from data, to knowledge, and to wisdom has about it the same random quality of unpredictability as the process of evolution. . . . (p. 154)

Moreover, Fairthorne (1965) observed that:

> Clearly, "information" and its derivatives are words to avoid. Especially should they be avoided by those, from computer mechanic to information scientist, who nowadays have to talk about the use, mention, representation, and interpretation of linguistic expressions. Nevertheless, at present their technical writings exhibit one common characteristic: they use and mention the word "information" more often in more senses than do any others.
>
> Sometimes an alert, knowledgeable, charitable, and patient reader can deduce that by "information" the author denotes "signals," "documents," "assertions," "notions," "sensations," "printed marks," and so on. Sometimes he can deduce only that the writer believes the word to be the name of a distinct self-subsistent entity or mystic essence. "Information" is not an entity, though people who use the word or are bombarded with it often enough get to believe that it is. Actually it is no more than a lingusitic convenience that saves you the trouble of thinking about what you are talking about.
>
> . . . .
>
> People are reluctant to believe that nouns do not refer to some external entity. This is one reason for the widespread belief, conscious or unconscious, in what is most aptly called "The Phlogiston Theory of Information."
>
> This is analogous to the eighteenth-century theory of caloric and is equally harmful, distorting and obscuring the proper nature and targets of the information sciences. Use of "information" as the name of some universal essence, that can be squeezed out of texts like water from a sponge, blurs fundamental differences such as that between a library and a laboratory, an answer and a response, a command and a question, a fact and a factual statement, an event and a record of the event, and so on. All these distinctions are fundamental.
>
> Fortunately, one does not have to use the word "information." Always, if we put our minds to it, we can say what we mean. (p. 10)

These factors in conceptual chaos have characterized the definitional literature of information science from at least the 1950's and 1960's when Fairthorne was an eloquent critic of fuzzy

theorizing to the present day. Fairthorne (1965) warned:

> Inevitably, emerging activities breed ill-conceived words that at first obscure and obstruct rational action, the stubborn survivors remaining to plague students indefinitely.
> . . . .
> However, in our field, terminological corruption has gone well beyond what is inevitable into what is scandalous. . . . [Confused] terminology confuses both aim and effort. Those may travel the farthest who do not know where they are going, but they do not necessarily travel in the right direction. Some current targets may exist only as forms of words. (p. 9)

Machlup (1979) argued that:

> The theoretical constructs of consciousness, the human mind and free will are, I submit, indispensable intervening variables in the explanation of human action induced or facilitated by information. (p. 113)

These criticisms in the definitional literature of information science go unheeded. The same points of view, the same logical fallacies, have been repeated year after year in journal after journal and at conference after conference. The conceptual chaos in the definitional literature has inhibited conceptual evolution. This is reflected in the proliferation of names for the domain, in the specification of the nature of the domain, in its scope of objects and human beings. As with the definitional challenge in library science, the objective in the definitional literature of information science is to mark off the unique components of the domain, and so to devise a more adequate conceptualization of it.

2. The Name of the Domain

The conceptual antecedents of the term 'information science' were the terms 'bibliography' and 'documentation'. These terms were

used by Paul Otlet and Henri La Fontaine, the first in the 1890's and the second by Otlet at an international conference in 1905. 'Documentation' eventually supplanted 'bibliography' as the term of choice, and came to be closely associated with the practical objective of collecting and classifying the world's scientific and technical literature in order to promote international understanding and world peace. The central problem was conceived as the harnessing of technology to produce bibliographic and document accessibility, rather than as a theoretical investigation; Melvil Dewey's decimal classification system was selected as the conceptual structure for effecting this accessibility. Bradford (1948) and Rayward (1973) have surveyed segments of the early twentieth-century history.

Calvin Mooers coined the term 'information retrieval' in 1950, to refer to the problem of "directing a user to stored information, some of which may be unknown to him" (p. 572). He emphasized the "addressee or receiver" as the active agent in this form of communication. Information retrieval became identified with the post-war urgency to exploit hitherto secret technical reports by means of mechanized index manipulation. Thus, while the technologies of microfilm and punched cards had dominated documentation in the 1930's and 1940's, there was a rapid conversion in the 1950's of the scholarly community, at least in the United States, to computer solutions to problems of bibliographic, document, and information accessibility.

It was in the context of computers, mathematical information theory, cybernetics, operations research, and other quantitative approaches to behavioral and social phenomena that the American term

'information science' first appeared publicly in 1959, as a designation for the Moore School of Electrical Engineering's "computer and information sciences program" (Wellisch, 1972), and that the Russian term 'informatics' was first suggested in 1962 by Kharkevich in a letter to Mikhailov, as a designation for the discipline of scientific information (Mikhailov, Chernyi, and Gilyarevskii, 1967).

Concurrent with the popularization of these terms to identify the domain, there have been many additional proposals of conceptual terminology in the definitional literature. Among them are the following thirty-four neologisms:

- science information
- theory of scientific information
- information work
- information transfer
- information storage and retrieval
- information systems engineering
- information technology
- infometrics
- informetrics
- informatology
- informatistics
- informology
- informantics
- scientific informatics
- documental information
- documentalistic information
- documental informatics

- documentary informatics
- documentation science
- information and documentation science
- scientific documentation
- scientific documentalistics
- documentalistics
- documentology
- documentistics
- bibliology
- emmorphosis
- ergonomics
- cybernetics
- cybernetic pragmatism
- epistemo-dynamics
- epistemo-metrics
- social epistemology
- information professionals.

Thus we find that the conceptual terminology of information science and its antecedents has emerged as a rhetoric of labels, as manifestations of linguistic fashion rather than an indicators of paradigmatic shift. The changes in labels for the domain have outpaced advances in its conceptualization.

3. The Nature of the Domain

Like the definitional literature of library science, information science has been taken to be a variety of activities. The

literature has included the following descriptions: a spectrum of activities, a field of activity, an art, an art of practical necessity, a humanities, a craft, a technology, a federation of technologies, methods, a development of methods, a process, a group of techniques, a technique, an act, a practice-oriented discipline, an applied science, a practical science, an applied discipline, a profession, a professional field, a professional specialization, an occupational field, a developing profession, a science, a soft science, a pure and applied science, an interdisciplinary science, a scientific discipline, a synthetic science, a metascience, a social or behavioral science, a branch of the political sciences, a multiple paradigm science, a pre-paradigmatic science, a transscience, an immature science, an infant science, an emerging science, an integrating science, a domain of science or knowledge, a discipline, an emerging discipline, an emergent discipline, an intellectual discipline, an academic discipline, an integrative discipline, an interdiscipline, and interdisciplinary discipline, a macro-discipline, an evolving discipline, a composite discipline, a synthetic discipline, an inter- or supra-disciplinary activity, a developing field, an emerging field, a multidisciplinary field, a trans-disciplinary field, an interdisciplinary field, a field of study, an interdisciplinary study, a branch of study, a study, a field of interdisciplinary study, a basic area of inquiry, a field of inquiry, and a body of knowledge.

4. The Focus of the Domain

As with the definitional literature of library science, there

are three principal categories of focus in the definitional literature of information science. These are: an emphasis on objects, an emphasis on human beings, and an emphasis on both objects and human beings. This trichotomy forms the basis for categorizing and grouping the extant definitions, consistent with the taxonomy used in the chapter on library science. Within each broad category, definitions are further sorted according to the primary function assigned by the theorizer to the information scientist--and his or her peer informaticians, information specialists, information workers, and so forth. Each distinguishable functioning is treated as a set in the analysis which follows.

Three general comments are to be noted. The information science literature has produced a number of glossaries of technical terms; for a definition of the domain, some of these glossaries have simply repeated those which had already appeared in the literature, without any attempt to evaluate their adequacy, to identify features commanding consensus in the scholarly community, to synthesize the definitions, or even to point out gross contradictions among them. Thus, many of these glossary definitions constitute unexamined collections of overlapping, repetitive, and mutually incompatible statements. An effort has been made to identify the principal function or functions in each glossary's collection of definitions, and then the collection as a unit has been assigned to that function or functions.

Another general comment concerns the treatment of definitions encompassing both study and practice. Where the definition made clear the nature of the functioning of the practice, the

definition was assigned to that category; if the nature of the functioning was too vague to identify, or if the definition explicitly ruled out a practice, then it was assigned to the category of 'study'.

TABLE 5

SUMMARY OF INFORMATION SCIENCE DEFINITIONS

Definitional Focus	Generic Terms
5. Objects	5.1. To make accessible
	5.2. To retrieve
	5.3. To transfer
	5.4. To process
	5.5. To create and transfer
	5.6. To create and use
	5.7. To use
	5.8. To evaluate
	5.9. To manage or control
	5.10. To study
6. People	6.1. To teach
	6.2. To enlighten or inform
	6.3. To study human cognition
	6.4. To study knowledge
	6.5. To conduct research and advance knowledge
	6.6. To control knowledge
7. Objects and People	7.1. To make accessible
	7.2. To retrieve
	7.3. To transfer
	7.4. To process
	7.5. To counsel
	7.6. To link
	7.7. To create and transfer
	7.8. To create and use
	7.9. To use
	7.10. To evaluate
	7.11. To manage or control
	7.12. To mechanize
	7.13. To study

5. Definitions and Objects

Those sets of definitions focusing on functions with respect to objects are set forth in this section. They are: 1) To make accessible; 2) To retrieve; 3) To transfer; 4) To process; 5) To create and transfer; 6) To create and use; 7) To use; 8) To evaluate; 9) To manage or control; and, 10) To study. The table below indicates the generic and synonymous terms for each set of definitions.

TABLE 6

INFORMATION SCIENCE DEFINITIONS ABOUT OBJECTS

	Generic Terms	Synonymous Terms
5.1.	To make accessible	To make available render accessible render available give accessibility and utility give accessibility and usability provide access
5.2.	To retrieve	To discover discover and provide recover locate and select find find and provide recall trace
5.3.	To transfer	To distribute disseminate communicate dispense transmit
5.4.	To process	To handle rearrange and refine deal with merge and sort convert
5.5.	To create and transfer	To generate and provide generate and transmit

TABLE 6--Continued

	Generic Term	Synonymous Term
		To generate and communicate generate and disseminate generate and retrieve produce
5.6.	To create and use	To produce and utilize produce and assimilate originate and use generate and use issue and use create and exploit
5.7.	To use	To utilize exploit facilitate use facilitate utilization aid utilization
5.8.	To evaluate	To interpret review filter
5.9.	To manage or control	To plan and operate design and operate design and test operate command
5.10.	To study	To investigate analyze

These definitions exhibit the general weakness that the various sets of functions do not recognize the social nature of the given action; that is, the definitions do not mention that human beings are involved nor in what capacity or capacities they are involved. The focus is on manipulation of objects without specification of why. This incompleteness characterizes all the sets in this category of definitions.

Note that three or four examples of the definitions in a given set are cited below and additional statements are found in Appendix II, following the procedure set up in the previous chapter on the definitional literature of library science. Similarly, the convention for selecting the definitions from each set to be included in the text was to cite the earliest and the most recent statements, together with an intermediary one published somewhere in the mid-1970's, if available.

5.1. Definitions about Objects: To make accessible

This set of definitions focuses on accessibility and availability and in some instances accessibility is conflated with utility.

Pollard, 1948:

> [Documentation connotes] any process which serves to render a document or its contents readily available for consultation, . . . (p. 370)

Dembowska, 1974:

> [Informatics:] the science of scientific information. . . . (p. 184)
> . . . .
> [It] is research concerning scientific information understood as an activity, whose task consists in making accessible the outcome of science or of practical achievements in order to utilize these conquests for further development of science or for improving the practical activity in various domains. (pp. 184-185)
> . . . .
> [The] scope of investigations performed by informatics . . . is concerned rather with problems pertaining to methods, forms and means of transmitting and disseminating primary scientific information (first of all through the intermediary of documents of various types). . . . [The] problems of generation, collection and dissemination of secondary scientific information (bibliographies, abstracts, indexes, etc.) constitute the proper domain of informatics, . . . (p. 188)
> . . . .
> [The] basic subject of informatics is investigation of facts, phenomena and processes connected with transmission and dissemination of primary scientific information and with its processing and making accessible in the form of secondary information. (p. 191)

Harrod, 1977:

> Information Science. The study of the properties and behaviour of information, the forces governing the flow of information, and the means of processing it for optimum accessibility and usability. -H. Borko. (p. 420)

Comments

Although the function of providing access to given objects is appropriate for the domain, this set of definitions is incomplete in failing to specify for whom or for what the access is intended. Klempner (1969) criticized Taylor's (1967) definition of information science as the study and technology of processing information "for optimum accessibility and use". (See Appendix II.) "Optimum accessibility and use--by whom?--by machines?--by humans?" he asked (p. 341). Also, those definitions in which accessibility is taken as synonymous with utility are inadequate because two distinct concepts have been conflated. The definition by Mack and Taylor (1956) (in Appendix II) illustrates the difficulty in specifying 'documentation' as techniques 'in order to give maximum accessibility and utility' to information (p. 20). 'Utility' signifies 'usefulness'; one can not give usefulness to information, as that is the functioning of its users in the first instance, and perhaps of creators of information in a general sense. The rendering of usefulness is properly the charge of those engaged in development inquiry and in practice, development researchers and practitioners who transform theory into social benefit. The rendering of accessibility is not in the same domain of functioning.

5.2. Definitions about Objects: To retrieve

In addition to the generic term 'to retrieve', this set of definitions includes a number of synonymous terms. They are: to discover, to discover and provide, to recover, to locate and select, to find, to find and provide, to recall, and to trace.

Mooers, 1950:

> Pertinent recorded information cannot be used unless its very existence--and then its location--is discovered in a large collection. Thus "information retrieval," the discovery process, must be distinguished from the warehousing and reproduction aspects of documentation. (p. 225)

American Society for Information Science, 1975a:

> Retrieval. Analysis and evaluation of questions from information system users; formulation of search strategies and performance of searches of system files and other sources for information and/or data required to respond to the questions; preparation of replies in the form of documents, bibliographies, or specific answers or items of information.

Buckland, 1980:

> I am primarily concerned here with the training of information professionals and an example of the sort of subdivision which would seem useful is the distinction between information retrieval and other sorts of communication services. Information retrieval involves communication which is indirect and through time. It is, as Calvin Mooers [1950] put it, "temporal signalling". As such it has distinctive characteristics, notably the linguistic and technological problems of indexes, which are not characteristic of other sorts of communication. (p. 370)

Comments

This set of definitions emphasizes the finding of one or more objects from a collection of objects, but the term 'retrieval' has also been used to indicate discovery or rediscovery. The function of discovery, whether for the first time or again subsequent to an initial disappearance, is the function of the researcher and explorer.

The implication of information retrieval is at the least finding something again, if not its initial discovery, and so implies intervening loss or disappearance, and a two-stage process of having an object, losing it, and then having it again. This may describe a special case of searching for and obtaining a desired object, but to retrieve an object which was never possessed is a logically incoherent use of terms.

Moreover, connotations of retrieval now vary widely. The American Society for Information Science (1972), for instance, in a review of occupational functions, used the term in a very restrictive sense as in-depth question answering. (Reference service was defined as question answering that was not in-depth). Thus the term 'information retrieval' no longer signifies a theoretical domain of study and practice, but only one special case within it or one limited segment of the total functioning.

5.3. Definitions about Objects: To transfer

This set of definitions encompasses a variety of synonymous and quasi-synonymous terms, most of which have little technical precision. Among the terms used are: to distribute, to disseminate, to communicate, to dispense, and to transmit.

International Institute of Bibliography, 1908:

> Documentation is the assembling, classification and distribution of documents of all sorts in all fields of human activity. (quoted by Schultz and Garwig, 1969, p. 153)

American Society for Information Science, 1975:

> Information Science is concerned with the generation, collection, organization, interpretation, storage, retrieval, dissemination, transformation, and use of information, with particular emphasis on the applications of modern technologies in these areas. As a discipline, it seeks to create and structure a body of scientific, technological, and systems knowledge related to the transfer of information. It has both pure science (theoretical) components, which inquire into the subject without regard to application, and applied science (practical) components, which develop services and products. (quoted by Griffith, 1980, p. 5)

Davis and Rush, 1979:

> Information science is an interdisciplinary field concerned with all phases of the information transfer process. (p. 3)
> . . . .
> As an interdisciplinary field, it [information science] can be viewed as a spectrum of activities ranging from information theory through information technology to service-oriented functions, such as library and information center management. (p. 4)
> . . . .
> A system for information storage and retrieval can be thought of as a special case of the general communication system in which the processes are especially independent of time. (p. 61)
> . . . .
> Usually when people speak of information retrieval, they mean document retrieval; this is natural, because information is stored in documents, which are then usually indexed and/or classified to facilitate their retrieval. (p. 64)

Comments

This set of definitions connotes a moving or conveying of something from one point to another in time, in space, or in both. These terms focus on actions by the initiators or senders of the given objects and fail to specify actions by the recipients thereof. Moreover, the transfer function does not clearly delineate a domain of information science, because other persons function to move information or knowledge across time and space, including publishers and distributors, journalists, electronic broadcasters, and teachers.

5.4. Definitions about Objects: To process

This set of definitions encompasses the following terms: to handle, to rearrange and refine, to deal with, to merge and sort, to extract, to manipulate, to convert, and to transform.

Stevenson, 1958:

> Documentation is really the business of handling specialized information. It includes not only the organization and retrieval of such information, but its creation and distribution. The basic unit handled--at least in the technical field--is the unpublished research report. (p. 128)

Weeks, 1974:

> As a generic term, information handling may be said to include the domains of information retrieval and information processing. The first suggests a primary concern for organizing, storing and recovering from a store by means of an address, and is more precisely described as document recovery. The notion of information processing interposes another operation by which information is extracted from its source and entered into a store comprised of units of information. Both are distinct from data processing which, as its name implies, performs various computational operations so that data may emerge as information. Much has been learned and applied to the technology of building systems to handle information, but considerably less is known about the characteristics of behavior of information itself. (p. 3)
> . . . .
> Nor is there general agreement that it [the field of study] is properly called information science, rather than Scientific and Technical Information, Informatics, or by an earlier, more restrictive name, documentation. In fact, all these designations imply certain differences in emphasis, if not in some fundamental issue. Documentalistics is used here as the domain of synthesis of what is known about information and its qualitative characteristics as they are concerned in recording, processing, and transferring knowledge. (p. 4)

Griffith, 1980:

> Information science seems to have had, as a science, only one source of fundamental research problems, scientific and technical information. Hopefully, we will see more research and new applications in management information systems. (p. 3)
> . . . .
> Information science and the offering of information services have reached their highest development in handling scientific information. (p. 9)

Comments

This is an ambiguous set of definitions, connoting manipulation, special treatment, or management and control of objects; the more recent designation of processing is 'to subject to a rapid examination and handling designed to dispose of routine details', or 'to take care of, attend to, or dispose of by some largely routine procedure' (Webster's Third New International Dictionary, (1961) (WT). Also implied is the transformation or changing of the objects which have been processed. In the case of information or knowledge, this implication is inappropriate, since the information or knowledge are not changed in the context of the domain of information science. Indeed, the objective is to represent the informational or knowledge content in such a way that the intended original meaning of the content is maintained. Thus, the term 'data processing' is easily comprehensible, but 'information processing' or 'knowledge processing' is ambiguous and somewhat misleading.

5.5. Definitions about Objects: To create and transfer

This set of definitions enlarges the domain to encompass the creation or generation of objects, in addition to the subsequent functions described by such terms as providng, transmitting, retrieval, dissemination, and communication.

Perry and Kent, 1957a:

> [Documentation] is based on a group of techniques necessary for the ordered presentation, organization and communication of recorded specialized knowledge in order to give maximum accessibility and utility to the information contained. For purposes of this analysis this group of techniques may be subdivided under the following general headings.
>
> 1. The generation of manuscripts by authors or similar preparation of the originals of other documents.

2. The distribution of documents either in toto or in abstract form to provide current awareness of recent advances. . . .
3. The storage of documents in conjunction with appropriate processing to facilitate subsequent use.
4. The retrieval of documents from storage to provide information needed in connection with current problems and situations. (p. 80)

Taylor, 1972:

> Information science is concerned with . . . the phenomena of message generation, storage, organization, structure, filters, and transfer. . . . Its objective is to explicate, to state, and to test hypotheses relevant to information systems and communication environments. (p. 152)
> Information engineering is directed toward the design and testing of devices and systems useful for the solution of actual problems in operating environments. Its principal concerns are the design of experiments and the evaluation of results in operating systems. (pp. 152-153)
> Information services . . . is directed toward . . . service functions in information centers and other knowledge dissemination systems. (p. 153)

Zunde, 1981:

> The subject of study of information science is empirical phenomena associated with various information processes such as information generation, transmission, transformation, compression, storage and retrieval. The ultimate purpose is to gain a better understanding of the nature of information. (p. 341)

Comments

The domain envisaged by this set of definitions includes not only the function of rendering accessible and so forth, but also the creation of whatever is to be rendered accessible. The inclusion of the function of creating is not logically inherent in the domain of information science, for creativity is properly centered in researchers, scientists, inventors, artists, and authors.

This set of definitions illustrates the conflation of study and practice, for it would be one thing to study the process of knowledge creation or information creation but it is quite another to engage in

such a process. Engaging in creativity makes one a creator, not an information scientist. As Vickery (1973) noted: "We know very well that the discipline [of information science] does not study all aspects of information--for example, laboratory research (which generates information) and academic instruction (which communicates it) are not part of the field" (p. 147). In addition, such terms as information science "deals with" or "is concerned with" or "treats of" are imprecise and ambiguous action terms: studying and doing are not properly distinguished in the use of such descriptions.

5.6. Definitions about Objects: To create and use

Further enlarging the domain of information science is a set of definitions which extends from the creation of objects through intermediate processes to their use.

Otlet, 1903:

> [Documentation] is the total of documents of any kind, together with the processes connected with the production, collection, dissemination and utilization of documents. (quoted by Dembowska, 1968, p. 53)

American Society for Information Science, 1975:

> Information Science is concerned with the generation, collection, organization, interpretation, storage, retrieval, dissemination, transformation, and use of information, with particular emphasis on the applications of modern technologies in these areas. As a discipline, it seeks to create and structure a body of scientific, technological, and systems knowledge related to the transfer of information. It has both pure science (theoretical) components, which inquire into the subject without regard to application, and applied science (practical) components, which develop services and products. (quoted by Griffith, 1980, p. 5)

Rayward, 1977:

> [The] generalized study of the creation, recording, representation, distribution, conservation, storage, retrieval and use of recorded

> information has been given the name "information science." (p. 278)

Afremov, 1981:

> The FID/RI [International Federation for Documentation Committee for Research on the Theoretical Basis of Information] programme envisaged the development of informatics (information science) theory, revealing the links between informatics and other scientific disciplines and showing the laws behind scientific information creation, transformation, transfer, and utilisation in various fields of endeavour. (p. 17)

Comments

Like the creation of objects, which is the province of authors and the like, the use of objects is the function of users, consumers, inquirers, and other seekers. Again, the problem with this set of definitions is the conflation of study and practice; the study of the use of information or knowledge would be an acceptable component of the domain of information science, but engaging in the use thereof takes one outside this domain.

There is one qualification of this general evaluation, which is that some definitions have held that the production of indexes, catalogs, abstracts, and the like constituted a kind of utilization and creation of a kind of information or knowledge; some theorizers have referred to this as intermediate information or secondary information; Vickery (1973), for instance, refers to intermediary publications (p. 152). Whether or not such tools of access to recorded discourse should be taken as the use of information to create secondary information is open to further study, but in any event this distinction must be clearly specified by theorizers who include it in the domain of information science. The creation and use of primary information are the functions of authors and

users, not the functions of information scientists. Further, as Rich (1979) has pointed out:

> [Many] traditional disciplines have become interested in problems related to knowledge generation, dissemination, and application, including economics, political science/public administration, marketing, library science, sociology, social psychology, history, and history of science. In addition, many interdisciplinary programs on science policy, technology transfer, and science and society have been keenly interested in this area. The group of questions being addressed range from the role of the knowledge industry in the growth and development of the economy to questions of how individual cognitive styles affect the way in which information is processed. (p. 19)

Moreover, the notion of use is multifaceted, and, with particular respect to information or knowledge, there are many types of usage that go far beyond the problem solving and decision making implication that many theorizers in the literature of information science have envisaged. Usage may be for enlightenment, exploration, entertainment, curiosity, intellectual stimulation, inspiration, guidance, titillation, and so on. As Ziman (1969) argued with respect to the nature of scientific advancement,

> [The] primary literature is fragmentary, and only intelligible within the context of active research. It is a ridiculous, but commonly held, belief that the publication of the results of particular investigations is sufficient to create a body of knowledge. On the contrary; the information to be gleaned from a primary scientific paper is often about as meaningful as an entry in a telephone directory, or map reference in a military despatch; it only acquires significance by use, or by its place in a larger pattern, which must at some stage be made explicit. The job of the review writer is to sift and sort the primary observations and to delineate this larger pattern.
> . . . .
> I cannot emphasize too strongly the importance of this activity of intellectual synthesis--a process of purification by recrystallization that must go through many stages, spread over many years, from the lecture by the chairman of a topical conference to the review article, monograph, textbook, encyclopaedia, and the haute vulgarisation of scientific journalism. Any notion that we may have about the nature of science includes the belief that something like an overall pattern is to be discovered and described. What we need is scientific knowledge--not more and more miscellaneous and unrelated information. (p. 323)

. . . .
We are so obsessed with the notions of discovery and individual originality that we fail to realize that scientific research is essentially a corporate activity, in which the community achieves far more than the sum of the efforts of its members. It is not enough to observe, experiment, theorize, calculate and communicate; we must also argue, criticize, debate, expound, summarize, and otherwise transform the information that we have obtained individually into reliable, well established, public knowledge. (p. 324)

5.7. Definitions about Objects: To use

Synonymous terms for the function of using objects include to utilize, to exploit, to facilitate use or utilization, and to aid use or utilization. This set of definitions ignores the initial creation process and focuses instead on the use of information or knowledge.

World Congress of Universal Documentation, 1937:

Documentation: The determination, identification, collection and use of documents.
. . . .
Documentalist: Specialist concerned with documentation.
(quoted by Mohrhardt, Special Libraries 47 (November, 1956): 414)

Slamecka, 1965:

Information science is an interdisciplinary field of study of the nature, properties, control, and use of information. (p. 91)

Lipetz, 1980:

The fundamental and unifying activity of those who work in the information field--and the basic social value of the information science profession--is the facilitation of the utilization of records.
. . . .
In the broadest sense, anything durable that can convey meaning can be regarded as a record. . . .
. . . .
Facilitation means beneficial action--knowing about possible actions and their relative values in a given situation and being able to carry out or to organize the indicated action. (p. 21)

Comments

Like the previous set of definitions, the function of using objects is beyond the domain of information science and in the province of users, consumers, seekers, researchers, authors, and the like. Some of the definitions qualify the relationship to use by suggesting that the domain is the "facilitation" of use, but this interjection obscures rather than clarifies the functioning of information science. To facilitate is to assist, to aid, or to help, and so facilitating use does not specify whether the action is indirect or direct, whether the facilitation is by a colleague, an assistant, a journal editor, a publisher, an educator, and so forth.

5.8. Definitions about Objects: To evaluate

This set of definitions encompasses interpretation and review.

Ansteinsson, 1939:

> Though this technique [of documentation] covers all fields of knowledge, it has received its chief support in the fields of industry, technology, and business, which possess the largest mass of literature and require the speediest information service. . . . The enormous increase in scientific publication has given rise to problems of organizing, disseminating, and evaluating knowledge which are as urgent as those of acquiring it. . . . Since libraries are chiefly concerned with the preservation of printed matter, the documentation center has been created to supply, organize and evaluate the materials and the results of research in whatever form they appear. . . . Documentation is a work of synthesis as well as of analysis; the mass of isolated data must be systematized by the use of the Universal Decimal Classification or one of its alternatives, . . . (p. 1348 in Library Literature, 1936-1939)

Landau, 1966:

> Documentation (see Landau, 1958).
> . . . .
> Information work is distinct from librarianship and should

> in no way be confused with it. It is defined as the collection, collation, evaluation and organized dissemination of scientific and technical information, which includes such practices as (1) abstracting, reviewing progress and other similar technical writing; (2) translating scientific and technical writings; (3) editing such writings as emerge from (1) and (2); (4) indexing, subject classification and retrieval of scientific and technical information; (5) searching scientific and technical literature, preparing bibliographies, reports, etc.; (6) obtaining and providing scientific and technical information and tendering advice thereon; (7) dissemination of information and liaison and field work for that purpose; (8) research on problems in information work. (p. 225)

Farradane, 1972:

> [Information work is] the collection, collation, evaluation, and organized dissemination of scientific and technical information. If by "technical" there is to be understood any field having established techniques, then the definition will still be adequate. (p. 674)

Comments

The evaluation function is outside the domain of information science, for it is logically inseparable from the discovery and utilization of information or knowledge. Evaluation taken to mean the analysis of documents or information in order to index or classify the content thereof constitutes the selection of symbols to represent that which already exists. Such an activity is of a different order than the activity of judging the validity or worth of information or documents, which is the function of producers and users. Where evaluation refers to system evaluation, collection evaluation, or user requirements evaluation, the term is acceptable but such a function does not constitute the whole domain of information science.

5.9. Definitions about Objects: To manage or control

This set of definitions encompasses managing or controlling functions. Related terms in the literature are: to plan and operate, to design and operate, to design and test, to operate, and to command.

Hattery, 1962:

> The science information function can be conceived and designed as a system. . . . The planning and operation of a science operation system and many of its elements calls for a combination of knowledge, understanding and skills which is bringing a new profession into focus--the science information specialist or documentalist. (p. 14)

Jones, 1973:

> Informatics aims to be an inter-disciplinary approach to problems, especially those relating to structure and meaning, encountered in the design and operation of information systems. Further, techniques developed to improve information systems may be exploitable in a wider context. (p. 491)
> 'Information system' is probably too broad in meaning, but 'information retrieval system' would be too restricted as it may be desirable to examine such areas as authorship which retrieval systems would exclude. (p. 492)

International Business Machines, 1981:

> Documentation. (1) (ISO) The management of documents, which may include the actions of identifying, acquiring, processing, storing, and disseminating them. (2) (ISO) A collection of documents on a given subject. (p. 134)

Comments

The function of managing or controlling as a definition of the domain of information science is incomplete because it does not specify for whom or for what the functioning is intended. Further, management and control are general concepts not restricted to a given practice; there are hospital management, forestry management, political management, and so forth.

5.10. Definitions about Objects: To study

This set of definitions focuses narrowly on investigation and analysis to the exclusion of any kind of social practice. The set also includes those statements considered to be too vague to identify the nature of the intended social practice, for instance, "information science is the study of information flow."

Conference on Training Science Information Specialists, 1962:

> *Information science.* The science that investigates the properties and behavior of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. The processes include the origination, dissemination, collection, organization, storage, retrieval, interpretation, and use of information. The field is derived from or related to mathematics, logic, linguistics, psychology, computer technology, operations research, the graphic arts, communications, library science, management, and some other fields. (p. 115)
>
> . . . .
>
> *Information scientist.* One who studies and develops the science of information storage and retrieval, who devises new approaches to the information problem, who is interested in information in and of itself. (p. 114)
>
> . . . .
>
> *Documentation and documentalist.* We have avoided use of these two terms because of the wide variation in their use and in the numerous interpretations of their meaning. We suggest, therefore, if anyone should wish to use these terms he should state his particular definition. (p. 116)

Chernyi and Pashchenko, 1974:

> Specialists from different countries have different notions on the scope of informatics as a scientific discipline. Thus, representatives of the French information school distinguish 'sciences de information' [sic] and 'informatique', the latter being understood as a field of knowledge studying processes, methods and technical means of automatic processing of any information. . . .
>
> Representatives of the Soviet, American, Czechoslovak and Rumanian information schools understand informatics as a science studying the structure and properties of scientific information and all the processes of scientific communication including automatic processing of scientific information. However, purely technical questions of computer-based data processing lie, to our mind, at the periphery of this scientific discipline. (p. 300)

Pearson, 1980:

> Information Science is a basic natural science which can be identified with empirical semiotics, the paradigm for the trinary natural sciences. . . . The basic concept for the foundation of the entire field of Information Science is that of the 'sign'.
> . . . .
> In fact I have many times identified information science with semiotics as constituting the same basic empirical science. However, since present-day semiotics is best known for its speculative, non-empirical adherents, while Information Science concentrates almost exclusively on its technological nonbasic engineering aspects, I have most often framed this identification by means of the aphorism: IS^3 which simply means:
> Information Science IS Instrumentation
> + Semiotics. (p. 367)
> . . . .
> Information is conveyed by a carrier which has a physical component. This carrier is called a 'MESSAGE' in a very broad sense. . . . The atomic carriers of information are called 'SIGNS'. Signs thus form the most basic concept of information science. (pp. 367-368)
> Information is thus carried in messages which are systems of one or more signs. In written alphabetic languages the system is a string; therefore a message is a string of one or more sign. However, in a painting, the message is a two-dimensional structure of one or more signs and in a piece of sculpture or a work of architecture the message is a three-dimensional structure of one or more signs. (p. 368)

Comments

The above definition of the Conference on Training Science Information Specialists (1962), highly cited in the definitional literature, illustrates the conceptual ambiguity and imprecision issuing from the conflation of study and practice and from the narrow focus on an object or objects. Information properties, information behavior, information flow, information flow forces, information processes, and the information problems are terms largely devoid of meaning. Klempner (1969) criticized these typical phrases.

> What is it that we mean when we say that we are going to investigate the properties and behavior of information? Does information have properties? What is information? What is it that we are studying? (p. 339)

"Quite obviously," he noted, "as an interdisciplinary field, information science seems to have few limitations" (p. 339).

In addition, it should be observed that the Conference charged the information scientists with the study of "the science of information storage and retrieval" but there is no reference to such a science in their definition of information science; the discipline and its practitioners are thus seen to have different functions, though clearly the Conference did not intend this conceptual divergence.

Finally, their definition specifies the study of designated information processing means but does not indicate whether these means are human social, biological, or physical processes, and so it is not clear whether there is a human function involved or whether a human practice is involved. The definition treats information as though it were a physical phenomenon that can be analyzed independently of human actors.

Otten and Debons (1970), among others, made this claim more explicit in their assertion that information is a "fundamental phenomenon" like energy. Wellisch (1972) rejected this "bald statement" as not qualifying as a definition (p. 174).

Brookes (1972a) suggested that the search for fundamental laws of information phenomena was a doubtful venture. Roberts (1976) observed that:

> In this view information science should concern itself with the objectified phenomena of information divorced, to a large extent, from information work as practiced by information intermediaries and divorced also from the individual. This is not to deny that the practicalities of information work may be investigated to useful purpose; but such investigations cannot be thought of as information science. In general terms the separation of science and practice in this fashion is justified because in the maintenance of such a distinction lies the

> greater possibility of establishing fundamental laws. For Brookes the establishment of such laws is of paramount importance.
>
> The empiricism informing such views is not uncommon in the social sciences. (p. 254)

Cook (1976) also criticized Brookes' definition that "information science is the scientific study of information phenomena" as a circular one.

> Information studies information. To clarify the ambiguities of what is really a non-definition one must ask him to define "information phenomena" as well as to state what he means by "scientific study." Just how do you do the one to the other? Though Brookes admitted that he could not define information, he concluded that he could measure it by Shannon's theory which he predicted would become a theoretical "cornerstone of the new science."
>
> However, according to a 1971 paper by the Russian scholar E.P. Semeniuk [Semenyuk], that is just the problem: Shannon's theory is a theory of measurement which wholly ignores the question of what information is. (p. 20)
>
> . . . .
>
> In other words the theory which Brookes would propose as a "basic cornerstone" of information science is one which never found it necessary to develop any understanding of what was meant by information itself. (p. 21)

The fundamental weakness in the logic of these definitions is the missing element of the human being in interaction with other human beings, and so the possibility of specifying a social function for investigation is ruled out. No problem domain is set forth.

6. Definitions about People

The definitions in the literature of information science which focus on people conceive of functions that seek to influence, change, or manipulate human thought and human behavior, or of functions that seek to study human cognition. The adoption of cognitive science as an element within the domain of information science did not appear in the

definitional literature of library science (see Chapter Two, Section 6).

There are seven sets of definitions which focus on people: 1) To teach; 2) To enlighten or inform; 3) To study human cognition; 4) To study knowledge; 5) To conduct research and advance knowledge; and 6) To control knowledge. The table below indicates synonymous terms for each set of definitions.

TABLE 7

INFORMATION SCIENCE DEFINITIONS ABOUT PEOPLE

	Generic Terms	Synonymous Terms
6.1.	To teach	To educate guide train demonstrate help learn link communicate
6.2.	To enlighten or inform	To serve understanding serve decision making conduce collective thinking
6.3.	To study human cognition	
6.4.	To study knowledge	
6.5.	To conduct research and advance knowledge	To extend knowledge discover information gaps observe and classify facts intervene in data production
6.6.	To control knowledge	

6.1. Definitions about People: To teach

This set of definitions encompasses the following terms: to educate, to guide, to train, to demonstrate, to help, to learn, to link, and to communicate.

Mooers, 1960:

> If the machine aids the customer by guiding him in the use of the retrieval system, the machine is necessarily educating the customer. Let us, therefore, look upon a machine retrieval system as an educational tool. . . . [The] customer can profit from some coaching by the machine in order to tap efficiently the information resources during the search process.
> . . . .
> Taking this view of a machine information center serving both as a retrieval device operating upon a store of information and as a teaching device for the human customer, one can see that the process of input request formulation and the process of giving out information will merge into a sustained communication between the customer and the machine. (p. 234)

Slamecka and Zunde, 1971:

> Interpreted uncommonly broadly, "education of information users" is tantamount to education in the acquisition of knowledge, as carried out through the social establishment of formal education and schooling. Among the purposes of education are to inculcate the habits and techniques of asking questions (identifying information needs), locating sources of information, and acquiring "knowledge". The process of learning is sometimes viewed as an "information process", and the enterprise of education as an "information system"; . . .
> At some time in the future, when information science will have developed the concepts, methods and tools of a regulatory discipline with respect to the management and use of information as a resource, education as a whole may come to be viewed literally as training of information users. (p. 357)

Havelock, 1977:

> [A] beginning has been made to spell out what is needed to integrate the library information function with the vital action centers of the society.
> This paper is intended to spell out one conception of how information centers can relate to the educational process. The core concept is that of the media or information professional who would be the essential ingredient of a vastly enlarged and upgraded notion of knowledge service.
> For knowledge storehouses to become knowledge centers we should not start with libraries as they exist today at all; I think we

> should start with a consideration of the routines of individual and social action which make up the ongoing life of the society; I will refer to these routines as "problem-solving." (p. 49)
> . . . .
> The process helper is first and foremost a teacher and a trainer and a demonstrator and only to fulfill these roles is he also a doer and an expert. Thus he encourages the client to take on the various problem-solving functions, to practice them, and to become more proficient and sophisticated in their use. Thus, there should come a time when this sort of change agent can leave the setting, having installed a self-renewing problem-solving capacity. This is the role envisioned for the media supervisor. (p. 55)
> . . . .
> [The] most effective resource person is therefore a linker, connecting users to more remote resources. (p. 59)

Comments

The definitions in this set conflate a number of notions which are not logically equivalent to the teaching function. Mooers (1960) breathes human intentionality into the machine, for it is patent that guiding, educating, coaching, and communicating are the province of human social interaction.

The function of teaching involves more than the information acquisition process assumed by Slamecka and Zunde (1971) and more than the helping, changing, and linking process or processes assumed by Havelock (1977). Brimelow (1974) posed the question of whether informatics is a part of education or education a part of informatics. He argued that the teacher is an appraiser and that informatics excludes appraisal. Similarly, Belth (1965) criticized the claim by Heilprin and Goodman (1965) that the communication of messages constituted a sufficient description of the functioning of both education and information retrieval. He called their proposed isomorphic relationship between education and information retrieval "a form of unguarded reductionism," for which the justification remained completely

unexplored (p. 2).

> In this reduction, education will disappear altogether from further consideration by stipulation. That is, it disappears within the definition of information retrieval. . . . But the psychological satisfaction which may derive from such a reduction is accompanied by an intellectual dissatisfaction. For, if the isomorphic analogy between the two is accepted in the form recommended, then any concern in the educative process for the development of the capacity to generate meanings not already intrinsic to the given data is not intrinsic to the process of education either. Its pursuit becomes an accidental development some time after education has occurred. And if this be the case, then the nurture of that intelligence which is the developed ability to interpret and explain, to alter and invent, is not the educator's responsibility. One even wonders how one learns to explore and distill, analogize and switch. (p. 2)

6.2. Definitions about People: To enlighten or inform

The function of enlightening or informing has also been described in the definitional literature by the terms 'to serve understanding', 'to serve decision making', and 'to conduce collective thinking'.

Donker-Duyvis, 1948:

> More than half a century ago la Fontaine and Otlet started their lives' work, which at first was connected with the term "Bibliography," but to which gradually the word "Documentation" was attributed. . . ,
>
> The great ideal . . . was to render accessible the totality of what is crystallized from human thought and to make of it a common treasure of mankind, serving to bring mutual comprehension and to build for peace by the co-operation of all men of goodwill of all nations. ("Foreword" in Bradford, 1948, p. 5)

Schober and Wersig, 1969:

> [Our] subject is composed of communication systems the object of which is to keep a well-defined group of individuals effectively and selectively informed in certain problem areas. (p. 34)
>
> . . . .
>
> Information is the state which results from the informing process.
>
> . . . .
>
> Informing is not a characteristic of the informing system but the actual objective of the system. The objective elements of the informing processes are, ideally, thought of as individuals:

> a particular person (e.g. a researcher), an organisation, or a team (which is made up of persons who behave as a single entity). (p. 34)

Artandi, 1975:

> Information science as a discipline assumes that information can be scientifically studied, analyzed, and controlled for its improved utilization at all levels.
>
> . . . .
>
> At a general level information may be looked upon as a means to ensure that changing societies make wise decisions. Information is sought about society as it is now, and about the ways in which it is changing, to find out what alternatives to present practices exist or can be found. We hope for "well-informed" decision-makers who will evaluate information in terms of society's goals and needs in the process of allocating resources.
>
> . . . .
>
> The concept of information is ambiguous, complex, and difficult to separate from such other concepts as communication and meaning. (p. 157)
>
> . . . .
>
> [Information] is always determined relative to the interpreter, his actual internal state and organization, . . . (p. 168)

Comments

The function of enlightenment is properly charged to political and social philosophers, to spiritual leaders, and to educators. More is involved than the provision of information and the possession of information. Thus, while enlightenment might serve as an ultimate objective of the domain of information science, it is the means by which to facilitate enlightenment that would constitute the function of this domain. Wooster (1963a) suggested that the information processing system of the future would have the capability to evaluate complex situations more effectively than human beings and even to make more rational decisions on their behalf. This is another instance of the fallacy of anthropomorphism. Machlup (1979) criticized the treatment of nonhuman matter of organisms as if they were thinking men:

> To treat or explain human action as if it were determined exclusively by physical and physiological forces is the . . . infelicitous fallacy of dehumanized, unwilled determinism of voluntaristic decisions. (Sir Karl Popper spoke of "the nightmare of the physical determinist" and of the belief in "masterswitch theories" of human decision making." The point at issue is the intercession of consciousness in the explanation of human thought processes, an intercession that would serve no good purposes in the explanation of physical, chemical, and physiological processes. (pp. 112-113)

6.3. Definitions about People: To study human cognition

This set of definitions encompasses the study of human thought processes from the neurological and the psychological to epistemology and logic.

Slamecka, 1965:

> Information science is an interdisciplinary field of study of the nature, properties, control, and use of information. Its underlying object of study, information, is a content-bearing element in the processes of communication, problem solving, decision making, and learning.
> . . . .
> The scope of information science as a field of study and professional practice may then be delimited as the sum of processes which possess as a common attribute an information phenomenon.
> In this light, the phenomenon "relations of information classes"--suggested here as a general phenomenon in information science--is a common attribute of such (non-exclusive) processes as information description, categorization, and indexing; code and symbol structuring and manipulation in natural, mechanical, and formal languages; human information (thought) processing, including understanding, recognition, reasoning, problem solving and learning; heuristic programming; visual and conceptual pattern recognition; and perhaps others. (p. 91)

Maron, 1971:

> [If] we are to move ahead in our theorizing about the design of information retrieval systems, then we must enlarge our conception of what the problem of <u>information access</u> is about. (p. 45)
> . . . .
> The heart of the so-called library problem is the problem of intellectual access to stored information. An understanding of the problem of access, in turn, leads to questions concerning

> information processing in the nervous sytem, and to questions of optimal organization of an intelligent artifact. This leads to neuro-physiology, psychology, and epistemology, as well as logic, computing, and the theory of artificial intelligence. There is a single name that has been given to this range of topics that clusters around the question of information and theories of information processing. I refer to . . . "cybernetics," but perhaps "information science" is a better title. (p. 46)
>
> . . . .
>
> [Information science] is concerned with explicating the full meaning of information, describing the properties of information, and establishing ways of measuring those properties. And information science is concerned with the formulation of theories on how to analyze, organize, relate, store, process, search for, and retrieve information. Information science is concerned fundamentally with the kinds and ways of information processing that correlate with the process of comprehending; i.e., information science, at its very core, is the scientific study of mechanisms for understanding. (pp. 46-47)
>
> . . . .
>
> [Information] can only be understood in terms of how it affects knowing systems. Thus information science is the scientific study of knowing systems (natural or artificial); i.e., it is the study of the information processing that must underline such activities as knowing, understanding, comprehending, believing, thinking, solving, etc. (p. 47)

Leupolt, 1981:

> A further question is what factual situations do exist that are derived from and linked with 'information' and how to define them, depending on whether the 'information' is the information process, information need, individual information demands, information source, information means, information work, information body or centre, information system, or others.
>
> A particular question is in which way the 'information' and the factual situations linked with it are being reflected by some mental process on this or that level as a problem in information, how they are to be investigated and defined by scientific methods, and what terms to use to designate these scientific reflections. The last question is of particular interest. (p. 20)
>
> The easiest solution for the designation problem concerning information science seems to be the usage of such terms as information science or information theory, which are used widely with a varying semantic content.
>
> . . . .
>
> The term informatics could . . . be saved for the corresponding sphere of reality or practice, that is, to designate the totality of information units and information processes occurring in practice (generally or in a limited sense), including the problems existing objectively and pertaining to them.
>
> Concerning informology (information science), a specific field (an informology of its own) will surely develop for those

> forms or kinds of information processes that are socially of special importance, because not all information processes will attain a relatively independent social significance. . . . (p. 21)

Comments

The study of human cognition in all its dimensions is the function of a number of disciplines: physical manifestations by cognitive science; mental manifestations by psychology; and rationality by philosophy. The domain of information science is neither isomorphic with any of these disciplines nor does it encompass them conceptually. For instance, the simple treatment of human thoughts as information and of human thinking as information processing enlarges the notion of information to an all-embracing designation rather than as any longer being equivalent to knowledge. Similarly, understanding and rationality are not merely products of information, but issue from educational and learning processes which have both biological and social dimensions.

6.4. Definitions about People: To study knowledge

This set of definitions posits the domain of information science as the study of knowledge, its nature, and its growth.

Kochen, 1969:

> [A] new scientific discipline is emerging. We might call it epistemo-dynamics. It is concerned with lawful regularities governing the acquisition of information and its transformation into knowledge, the assimilation of knowledge into understanding, the fusion of understanding into wisdom. These dynamic processes are presumed to occur in nature, of which evolving man and his societies are part. Nature, in its wisdom to date, has always

evolved enough self-regulating mechanisms to ensure stability at all levels.

. . . .

The new discipline could become the core of the information sciences. If it does emerge as a viable scientific discipline, then, by virtue of its central concern with stability, it will, as a significant branch of knowledge which has been evolved by nature's wisdom, ensure stability. (p. 195)

. . . .

A necessary condition, however, for this new discipline to grow into a viable field is that it be developed in the hands of both scientists and humanists. . . . The study of the growth of knowledge in a community is partly historical, partly humanistic, partly scientific. So is the study of learning in man.

. . . .

[Some authors] argue for the overwhelming importance of research on research, of developing a scientific understanding of science itself. We argue . . . that this is now becoming possible.

. . . .

An explication of learning viewed as reorganizing information is essential in any explication of the growth of knowledge in a community. (p. 196)

Merta, 1974:

Informatics is developing its own methods that include:
1) social epistemology, because informatics and especially theory of scientific information is an instrument for organization, management and control of the thesaurus of human knowledge. Informatics is actually the function of epistemology.
2) "informatization" as a new general method of science for studying all social phenomena from the point of view of generation, circulation and operation of information associated with such phenomena.
3) information system analysis and synthesis
4) content analysis and transfer of semantic content (not only measuring the ratio and amount of transferred information)
5) method of bibliographic organization and control of human knowledge (viz 1)
6) specific methods and techniques for selection of relevant information. (p. 267)

Kitagawa, 1978:

In fact our methodology can be recognized to amount to a preparation of a new trend in informatics in which knowledge as an organized and integrated information system will be a central object to be analyzed and to be synthesized. Thus we are preparing . . . a way to build up a new field of knowledge engineering covering four levels of intelligence, which the present author ventures to introduce in the name of human, mechanical, biological, and social intelligence. (p. 101)

Comments

The functions of studying the nature and growth of knowledge is properly the activity of philosophers, historians, and sociologists. These functions are therefore outside the domain of information science.

6.5. Definitions about People: To conduct research and advance knowledge

This set of definitions suggests that the domain of information science is to guide and conduct research and so to extend knowledge.

Mooers, 1960:

> I predict that some of the machine information retrieval systems of the future will go considerably beyond the tasks of the mere citing of documents or providing their texts. I believe that some devices will also help the customer assimilate, or read, the output provided by the machine. (p. 234)
>
> . . . .
>
> If machines can store and correlate laboratory facts, and can communicate with laboratory workers, we must expect that, as a part of the correlation, the machines will discover gaps in the information, and will indicate to the laboratory workers the need for further experimentation in certain areas. . . . . The present work with pattern recognition will ultimately lead to a kind of machine eye--we now have machine hands for the handling of radioactive materials. An information central machine system, aided by such receptors and effectors, would become, in effect, a research scientist. (p. 235)

Harmon, 1973:

> Information science, that area of inquiry which focuses on information phenomena, processes and systems, is approached [in this chapter] as one of a set of communication or behavioral disciplines which emerged simultaneously around the time of World War II. (p. 87)
>
> . . . .
>
> The development of information science might be programmed to include new areas such as the science of research, which possibly exists as a latent component of information science. A potential long-range role for information science involves active participation in forming a complete suprasystem of knowledge that could unify the arts, sciences, and professions. Finally, information science could strive to overcome the limitations of human memory and thereby increase the scope of human comprehension. (pp. 109-110)

Piganiol, 1976:

> As we have shown, documentation is concerned with constructing and organising knowledge. . . . But, just as it is influencing the system of publications, it could also usefully collaborate with the philosophers investigating the nature and structure of knowledge--guiding their work and benefitting by its results. (pp. 15-16)

Comments

The function of research is performed by researchers such as scientists and philosophers and humanities scholars, and so lies outside the domain of information science. It should also be noted that the conception by Mooers (1960) of the machine as research scientist is another illustration of the gross anthropomorphism so articulately criticized by Machlup (1979).

6.6. Definitions about People: To control knowledge

The single instance in the definitional literature of this function as the domain of information science is:

Penland, 1969:

> Information science looks at documents and their contents as a method for promoting and controlling knowledge growth and development. As such, the document serves the literature scientist as a source and a base in his quest for knowledge synthesis and condensation. (p. 480)

Comments

To control knowledge taken as the control of ideas is an inappropriate function in human society.

7. Definitions about Objects and People

Since the domain of information science constitutes a social domain, it is only definitions encompassing both objects and people that possess the rudimentary components for constructing a logically adequate description. Definitions meeting this condition are grouped into the following sets: 1) To make accessible; 2) To retrieve; 3) To transfer; 4) To process; 5) To counsel; 6) To link; 7) To create and transfer; 8) To create and use; 9) To use; 10) To evaluate; 11) To manage or control; 12) To mechanize; and, 13) To study. The table below indicates generic and synonymous terms for each set of definitions.

TABLE 8

INFORMATION SCIENCE DEFINITIONS ABOUT OBJECTS AND PEOPLE

	Generic Terms	Synonymous Terms
7.1.	To make accessible	To make available have available provide access gain access obtain access put before have at hand
7.2.	To retrieve	To discover discover and procure recover facilitate recovery locate find find and convey search search and find search and detect identify and search help to identify direct to receive

TABLE 8--Continued

	Generic Terms	Synonymous Terms
		To obtain scout for select select and extract extract provide produce supply satisfy answer directly
7.3.	To transfer	To distribute disseminate facilitate dissemination communicate facilitate communication enable communication transmit and receive facilitate transfer convey deliver supply propagate purvey provide
7.4.	To process	To handle manipulate manipulate and handle deal with transform transform and reduce reduce and organize change operate on
7.5.	To counsel	To help aid diagnose, prescribe and monitor
7.6.	To link	To create links provide leads interact connect switch interface help interface

TABLE 8--Continued

Generic Terms	Synonymous Terms
	To effect contact provide contact mediate intermediate interrelate
7.7. To create and transfer	To generate and transfer generate and disseminate create and disseminate discover and disseminate produce and disseminate prepare and distribute package
7.8. To create and use	To create and exploit generate and use generate and apply generate and exploit produce and utilize
7.9. To use	To put to use exploit facilitate work facilitate use enhance use help use utilize
7.10. To evaluate	To judge interpret
7.11. To manage or control	To plan design operate direct command correct or adjust maintain monitor engineer create and build develop implement evaluate assess construct manipulate

TABLE 8--Continued

Generic Terms	Synonymous Terms
	To organize administer make policy
7.12. To mechanize	To computerize automate decompose formalize and delegate
7.13. To study	To explicate seek to answer

It should be noted that many of the generic terms are used in the definitional literature as conceptual substitutes for each other, as conjunctions, and as double noun terms. For example, the term 'to deliver' has been used in place of 'to disseminate', 'to assimilate' in place of 'to transfer', 'to transform' in place of 'to create', 'to counsel' in place of 'to educate', 'to communicate' in place of 'to retrieve', and 'to process' in place of 'to transfer'. Frequent conjunctions in the definitional literature are 'retrieve and disseminate', 'transmit and receive', and 'process and manage'. There are also such usages as 'transmission link'. Thus, the definitions of the generic terms are not themselves mutually exclusive, but suffer from considerable conceptual overlap.

7.1. Definitions about Objects and People: To make accessible

Accessibility or availability of various objects to people were

the focus of this set of definitions.

Besterman, 1945:

> In other words, anything in which knowledge is recorded is a document, and documentation is any process which serves to make a document available to the seeker after knowledge. (p. 1)

Doyle, 1975:

> "Processing" can be thought of as a family of operations, each of which acts uniformly on every item of information presented, and includes the idea of having the items in a place available and in a form available for ultimate use. "Retrieval," also in a broad sense, suggests all processes that are selective in nature; this--the case can be made--would even include the process of reading, for the mind is very selective indeed in extracting information from the printed page. (p. 16)
>
> . . . .
>
> [An] information system can be thought of as a communication system which provides for an unlimited amount of delay between receiver and sender, and which, therefore, must store the messages in some static medium, and which must also have the messages in a state of availability for whatever future receiver may present himself. (p. 190)

Debons, 1978:

> If we are to help the user, our task must be to improve the interface between the user and that vast reservoir of data, information and knowledge available to him.
>
> . . . .
>
> To fill the void that now exists between the user and the resource requires a specific set of competencies. In my view, what a user needs is not access to data and information, but rather a skillful aid in the manipulation and organization of data that can be accessed and made available. (p. 485)

Comments

This set of definitions encompasses two related actions: the action of people seeking access to something, and the action of intermediaries providing access thereto. When this notion of the function of the domain is explicated in chapter five, it will become apparent that the term 'accessibility' is an appropriate designation for the

field of social practice with which we are concerned. Note, however, as was mentioned in section five, that the concepts of accessibility and utility are not logically interchangeable, and that utility is the function of information or knowledge users, particularly development researchers and practitioners. Also, access accessibility, and availability are terms occurring in the vernacular and so their current meanings are too general to be adapted ready-made to the special vocabulary of a disciplinable enterprise such as might be characterized by library science or information science.

7.2. Definitions about Objects and People: To retrieve

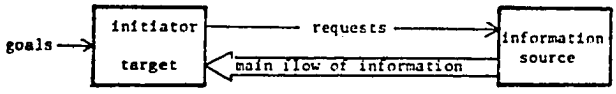
This set of definitions about objects and people encompasses a large variety of synonymous terms, among which are the following: to discover, to recover, to locate, to find, to search, to receive, to obtain, to select, to extract, to provide, to produce, to supply, to satisfy, and to answer directly.

Mooers, 1950a:

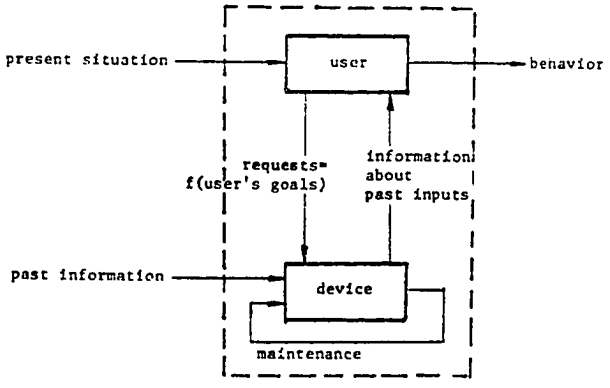
> The problem of directing a user to stored information, some of which may be unknown to him, is the problem of "information retrieval".
> . . . .
> In information retrieval, the addressee or receiver rather than the sender is the active party. Other differences are that communication is temporal from one epoch to a later epoch in time, though possibly at the same point in space; communication is in all cases unidirectional; the sender cannot know the particular message that will be of later use to the receiver and must send all possible messages; the message is digitally representable; a "channel" is the physical document left in storage which contains the message; and there is no channel noise because all messages are presumed to be completely accessible to the receiver. The technical goal is finding in minimum time those messages of interest to the receiver, where the receiver has available a selective device with a finite digital scanning rate. (p. 572)

Krippendorff, 1975:

> It is fair to say that most human communications theories have been concerned with sender initiated communications.
>
> . . . .
>
> The interest in information retrieval processes forces the communication researcher at least to consider another communication paradigm in which the dominant direction is turned around. I call this receiver initiated communication. Here the emphasis is placed not on a sender's attempt to induce changes in the receiver, but on the receiver's active search for information that would improve his own position or facilitate self modification. It begins with a request to an information source, which then returns the information wanted. Diagramatically, this would amount to the following:



> . . . .
>
> In receiver initiated communication, the information about the information needs precedes the transmission of information relative to the information that is transmitted; . . .
>
> . . . .
>
> I need not elaborate the fact that much of the communication in scientific research activities can only be understood as receiver initiated. (p. 34)
>
> . . . .
>
> From information retrieval literature, I took storage to refer to the material or procedural features that have the effect of maintaining information from the past; retrieval, to refer to the process by which their content is in some way reproduced; search, to refer to the processes by which relevant information is located within storage. (p. 32)
>
> . . . .
>
> Information retrieval devices can thus make a large system more history-determined. . . . Graphically one may depict the situation as follows:



(p. 18)

Walker, 1981:

> Information science is concerned with formalizing the processes of knowledge formulation, organization, codification, retrieval, dissemination, and acquisition.
> . . . .
> The major emphasis in information storage and retrieval has been and continues to be on bibliographic materials, helping the user to identify primary or source documents that might have information relevant to his needs and interests, . . . (p. 348)

Comments

Although Mooers' neologism 'information retrieval', promulgated in 1950, dominated much of the definitional literature in the United States in the subsequent fifteen years or so, the term is conceptually inadequate. If it is taken to signify 'to find' or 'to locate', then either of these terms suffices. If it is taken to signify 'to find again' or 'to locate again' or 'to recover', then a condition of prior loss or prior loss of control is implied, but by whom is not indicated: by the user, by the author, by an intermediary, or by some combination thereof. Since the function of organizing objects for effective access by users is the responsibility of intermediaries, this function anticipates and prevents the occurrence of just such loss, confusion, or other inability to locate. If information retrieval is taken to signify discovery, then there is conceptual conflation, for discovery is restricted to ideas and things not known before by a society at large; something newly discovered can not be discovered again.

There is also the problem of mutliple and conflicting usages of the term 'to retrieve'. While some definitions have held it to signify the functioning of the entire domain of information science, others have relegated to it a much narrower activity. Krippendorf

(1975), for example, restricted it to classification or indexing, the process by which the content of materials "is in some way reproduced" (p. 32). Wellisch (1972) noted that the term 'information science' superseded 'information retrieval' as a generic term for the whole field, the latter having become reserved for discussion of the actual operations of retrieval systems or even more restrictively taken to signify mechanized retrieval (pp. 163-164). Similarly, Licklider (1973) observed that:

> Turning toward the other end of the continuum of scope, let me propose that we reject, also, the notion that information science is the science of the storage and retrieval of documents or data. That area is typified for too many people by narrowly envisioned retrieval and dissemination systems, computerized citation indexes, or conventional libraries, and it carries too strongly the connotation of storage warehouse or depot. . . . (p. 165)

Thus, the term retrieval is not an adequate concept to signify the function of the domain of information science.

7.3. Definitions about Objects and People: To transfer

This set of definitions includes such terms as: to distribute, to disseminate, to communicate, to transmit, to convey, to deliver, to supply, to propagate, to purvey, and to provide.

Otlet, 1934:

> [Documentation] means the activity linked with documents, as well as a collection of documents. Documentation can be understood as a technique--that is, a practical skill, as a system of organization of intellectual work, and as a theoretical science. The responsibility of documentation is to provide information based on documents concerning all the facts or scientific data. This information should be exhaustive, authentic, complete, rapid, up-to-date, easily accessible, anticipating the request and ready to be communicated, put at the disposal of the greatest number of users.

. . . .

The documentation practice embraces: a systematic collecting of documents, their classification, organization, presentation in the form of bibliographical descriptions including characteristics of contents, or in the form of monographs . . . the use of mechanical or chemical media in processes of production, reproduction, mimeographing, classifying, selection and dissemination of documents.

. . . .

The theory of documentation . . . bibliology or documentology . . . is concerned with the systematization of knowledge on documentation with definition of notions and with terminology, with the determination of the subject of investigations, with determination of the relation of documentology to other sciences within the general framework of science classification, with the organization of research and studies, with the history of bibliological sciences. (quoted by Dembowska, 1968, pp. 55-57, from his Traité de documentation. Le livre sur le livre. Théorie et practique. Brusells, 1934)

Saracevic, 1975:

At the turn of this century documentation emerged, which defined the problem at that time as one of the organization of knowledge; thus, it developed a concern with classification, indexing, etc. After the second World War information science emerged, which defined the problem at that time as one of providing the scientist with information; thus it developed a concern with relevance for it was perceived that the amounts of nonrelevance endanger communication.

. . . .

The distinction between information and relevant information was made in recognition of the selective mechanism of scientific communication and in order to underline the user orientation of IR [information retrieval] systems. (p. 324)

. . . .

Communication is a process where something called information is transmitted from one object to another. The first object can be called the source; the second, the destination. A dynamic, interactive feedback can occur between a source and a destination; they can exchange roles. . . . [The] role of environment can be considered. We may not know what information is as a phenomenon, any more than we know what energy, matter, gravity or electricity is; but we can study its behavior and effects. (p. 325)

. . . .

Imbedded in the communication of knowledge may be information systems which are aimed at enabling, enhancing, preserving or extending the process. And associated with such systems are sources and files. An information system selects from existing subject knowledge, subject literature and/or any of its representations, organizes the selections in some manner in its files, and disseminates the selections in some manner to given destinations. (p. 326)

Machlup, 1979:

> Information science, at the present stage of its development, is a not fully integrated assemblage of systematic studies of the processes regarded as information, particularly of the systems, operations and devices, technology, and organization, by which men--which of course stands for men and women--transmit and receive, and therefore transfer, knowledge among one another. (p. 111)

Comments

This set of definitions is characterized by the use of ambiguous and imprecise terms. For example, Brandhorst and Eckert (1972) defined 'document dissemination' as 'document delivery'. Lancaster (1977), following Weinberg (1963), defined 'information transfer' as 'cognitive assimilation', that is, the stage at which information is "absorbed" by the scientific community; in this interpretation, a reader is said to be "informed" by a document when "his state of knowledge on its subject matter is altered" (p. 54). Heilprin (1963) used the term 'transmission' to refer to the transfer of meaning "through systematic or intentional production of direct sense impressions (or their machine equivalents) the stimuli for which are characteristically but not exclusively of long duration" (p. 240). Licklider (1973), on the other hand, took transmission to be the physical processes associated with computer and telecommunications technology.

Another major deficiency with the notion of transfer is that it does not adequately distinguish between direct person to person communication, as characterized in a conversation or in a letter, and the kind of indirect communication characterized by securing a book

or newspaper. Bohnert (1964) criticized this concept of the domain.

> The broadest definition would be that Information Sciences cover all human communication, and hence all of history. Such a broad viewpoint was taken by Lawrence B. Heilprin in the 1963 Annual Meeting of the American Documentation Institute, at which he included even mind-to-mind communication. . . . (p. 49)

A further difficulty with the term transfer is that it does not indicate who the initiating and receiving subjects are, nor what functions they are performing. Indeed, the term 'transfer' does not appear to refer to any function at all, but is a purely descriptive term like 'information flow', which also does not refer to specific functions being performed within a domain of information science.

7.4. Definitions about Objects and People: To process

This set of definitions encompasses such terms as: to handle, to manipulate, to deal with, to transform, to change, and to operate on.

Vickery, 1961:

> Retrieval . . . is communication in time, . . . The information source is here a document in which information is recorded for later use. . . . But the 'source' in Retrieval is not the active, transmitting agent that it is in telecommunication. It is the 'receiver' who sends the message, a request for documents on a certain subject, and this message is not simply encoded and transmitted, it is transformed from descriptors to addresses and thence into documents, and fed back to the sender.
> . . . .
> The 'transformer' is the selector which searches the descriptor file, and the 'decoder' is the locator which searches and extracts items from the document store, the only source of new information for the 'destination'. . . . In applying information theory, we must be sure that it is in accord with our Retrieval diagram. (p. 6)

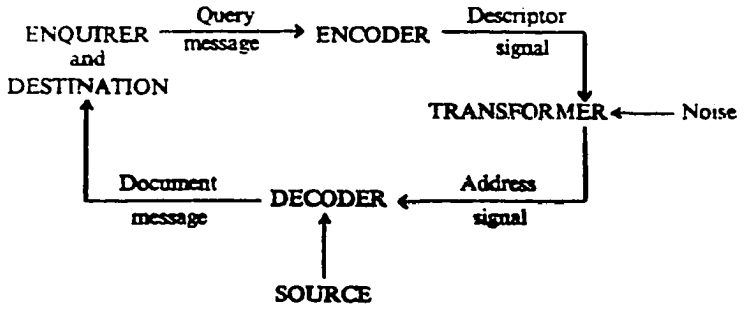


Figure 4

(p. 6)

. . . .

These, then, are the units into which I have analysed the general problem of information retrieval: the description of documents, the organization of descriptor language, document storage and location, file organization and searching, coding and mechanization. (p. 12)

Gupta, Shirey, and Debons, 1974:

> The science of information encompasses the theories and principles which concern the transformation of data into information. Included are the gathering, transmitting, processing, depicting, utilizing and transfer functions. Data remain data until acted upon by an organic information processor. . . . Information processing and utilization is a central phenomenon in the very existence of man, and its sociological and psychological effects can not be ignored. There is a need to perceive the information phenomenon as part of a large value system designed to optimize human development, and it is this approach that makes Information Science truly interdisciplinary. (p. 34)

Wersig and Seeger, 1979:

> An 'information system' then may be understood as a 'system the objectives of which are to organise communication processes, particularly between human beings, in order to effect optimal information'.
>
> . . . .
>
> The interrelations between these components may be described as operations enacted by personnel or material devices upon material devices or data carriers using rules and conceptual devices.
>
> The objectives direct these operations to fulfil the information needs of the clientele of the system thus enabling the system to transform incoming messages from various sources into

output messages with a high capacity for fulfilling the information needs of the clientele. (p. 20)

. . . .

The heart of the system (but not the system itself) is the 'transformation function'. . . .

. . . .

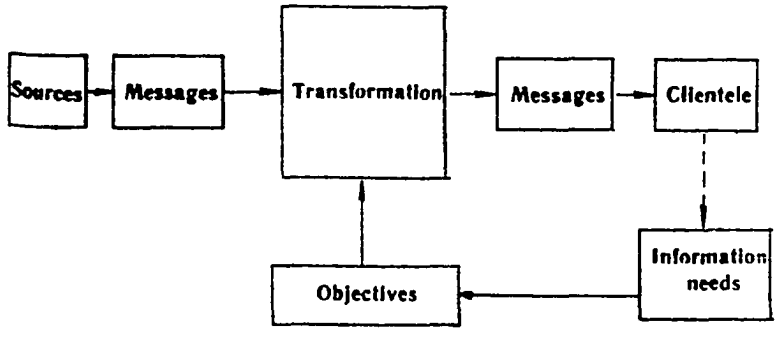


Fig.3

(p. 21)

Comments

Like the term transfer, the notion of processing is too ambiguous, imprecise, and general to describe the functioning of the domain of information science. Processing has been taken as a cognitive function, notably by Belkin (1974) and Debons and Montgomery (1974), who, respectively, conceptualized the process as cognitive transformation of data into information. As a cognitive function, processing would rule out the domain of information science taken as a social domain; this kind of processing is the concern of cognitive science and psychology.

Processing has also been taken as computer processing. Peters (1975), for example, defined 'information processing' as:

> All technical and commercial operations performed by computers. Normally used in a more general sense than the term data processing. (p. 85)

Horton (1974) added further confusion to the discussion in the definitional literature:

> The middle step in the information chain is often referred to as handling or processing. It is also sometimes called information transfer. This step occurs between information generation and information use. Between the time an item of information is first generated at its origin point, and the time a user acts upon it, information may pass through a very large number of intermediate stages, each of which may cause both its form and content to be altered significantly. The transformation of data into information is usually, but not always, one of the first steps in the information processing cycle. (p. 43)

The conflation of cognitive, mechanical, and social dimensions into the one term 'processing', 'transforming', and the like, is a logically inadequate move. Hence, this set of definitions will not serve to describe the domain of information science.

7.5. Definitions about Objects and People: To counsel

This is a relatively minor set of definitions.

Debons, 1975:

> The information counselor can serve the need of translating users' needs for information to procedures that would lead the user to a more effective application of the knowledge resource and the available technology related to the use of this resource.
> . . . .
> This distinction between information as some action that the individual undertakes in his day-to-day encounter with the environment, and information as a commodity subject to management and economics is fundamental in my view to information science and directly to the concept of the information counselor.
> . . . .
> It is the business of helping individuals form information from data and applying this capacity to day-to-day problems that the information counselor's role finds expression. If we are to help the user, the task is [to] improve the interface between the user and the vast reservoir of available data.
> . . . .
> [Competencies for the information counselor] can be subsumed under three (3) basic functions.

> First, the ability to diagnose the underlying motivational and personality factors which characterize the information need related to the specific tasks faced by the user. (p.63)
>
> Second, the ability to prescribe ways that the assessed needs can be satisfied through available data resources and technologies.
>
> Third, the ability to test the counseling function through continuous surveillance and evaluation. (p. 64)

Debons, 1978:

> In sum, I propose that user needs are inadequately conceived. It is in the reconception of these needs that the requirement for the information counsellor finds expression, in my judgment.
>
> . . . .
>
> If information is both a process and a commodity--and humans are involved in both--then the service that supports these functions should in fact have the capability of aligning both towards the achievement of maximum user satisfaction. This is what I believe is meant by the "user's needs". And the alignment function I propose can best be realised by the information counsellor who, of all resources, best understands the user's needs. (p. 484)
>
> . . . .
>
> I view the information counsellor as performing three essential functions as an interface between the user and the knowledge resource. To clarify my perception, let us view the information counsellor as acting analogously to the medical doctor. The state of the patient (user) is diagnosed, the doctor (information counsellor) relies upon his past experience with analysis symptoms and his familiarity with current research, and finally prescribes a treatment which subsequently is examined to determine its efficacy in providing recovery to the patient. Similarly, the user, a client of the information counsellor, states his need. Based on a thorough understanding of this need (through interview and other techniques) and a familiarity with available resources (libraries, computers, data bases etc.), the information counsellor prescribes a strategy and tactic for the resolution of this need. For example, the information counsellor serves as an interface, reflects a role characterised as "participating involvement with the user". As such, the information counsellor is part of a total information process--an information system in its own right. The information counsellor may suggest an interrogation of certain data bases, or he/she may recommend a visit to the reference librarian with a specifically stated query to be posed. (pp. 486-487)

Meadow, 1979:

> I see the field [of information science] as divided into three groups. Perhaps the largest of these consists of those who, by whatever name, are practitioners. Typically, they are involved in indexing, abstracting, search mediating or a combination of these. They are artisans or artists in that they take the stuff of information figuratively into their hands and directly do something

with it that requires a high degree of personal skill. A second group, of growing influence, are information system engineers. They design operating systems or components, from a computer program up to a complete network. They design systems for the practitioners to work with. The third group engages in science in the traditional meaning of that word, an organized systematic quest for new knowledge.

. . . .

The practitioner [by 2001] will more often operate in a counselling model, concerned not just with a given search, but with establishing a channel of communication between a particular person's computer, through a network, into another's computer. Thus, concern will shift from doing the search to arranging for data flow. (p. 219)

. . . .

I foresee them [information service organizations] evolving into something like today's certified public or chartered accountants: people who will help others interpret their information problems, provide them with advice and software to solve information problems, but, just as a CPA is not a banker, not provide the information themselves. They might be called Certified Information Counsellors. (p. 220)

. . . .

I see information science concerned with:

- the nature of information and information processes,
- measurement of information (including its value) and information processes,
- communication of information between humans and information machines,
- the organization of information and its effect on the design of machines, algorithms and human perception of information,
- human behavior in respect to the generation, communication and use of information,
- the principles of design and measurement of the performance of algorithms for information processing, and
- artificial intelligence applied to information processing. (p. 221)

Comments

This function is inadequately set forth in the definitional literature. The function has been viewed as analogous to the functioning of the medical doctor and at the same time as identical with the functioning of a diagnostician and an educator. Since the roles of doctor, teacher, social worker, psychologist, and counsellor are logically different, the role of an information counsellor can not be

merely defined in terms of one or more of these well-established functions in society. Thus, the domain of information counsellor is unclear from the literature.

7.6. Definitions about Objects and People: To link

This set of definitions encompasses such terms as: to interact, to connect, to switch, to interface, to effect contact, to mediate, to intermediate, and to interrelate.

Weitenkampf, 1908:

> [A document is] defined as anything which represents or expresses, by the aid of any signs whatever (writing, image, diagram, symbols), an object, a fact or an impression. They register all that is discovered, thought, imagined, projected, from day to day. The documentary method draws from these documents the facts necessary for study and research, thus truly offering to the student the collaboration of all who have previously worked over the same question. . . . Documentation, therefore, is the systematically organized intermediary between the public and the documents. (p. 403)
>
> . . . .
>
> The work of documentation would thus have for its object the analysis and summarizing of the documents, the co-ordination and codification of their contents.
>
> . . . .
>
> [Universal] documentation would truly become in its collections and its different repertories, a vast intellectual mechanism destined to class and condense scattered and diffused knowledge, and to distribute it wherever needed. (p. 404)

Bohnert, 1975:

> Intermediaries in retrieval systems must intercede in behalf of the requesters. First they must predict and then secure copies, or ready access to copies, of the messages most likely to be requested sooner or later. Upon request, they must select from the stored messages those most appropriate to a request, if any appropriate messages can be identified, and then they must provide copies of the identified messages to the requester, if any copes are available. (p. 7)

Brookes, 1980:

> The phenomena of primary interest to information science are the cognitive interactions between users and the public knowledge systems organized for ease of user reference in libraries and data bases. (p. 248)
>
> . . . .
>
> So how are information and knowledge related? . . . I have defined information as that which adds to or modifies a "knowledge structure," expressing this idea in the form:
>
> $\Delta I \rightarrow K(S + \Delta S) - K(S)$,
>
> in which the left-hand side represents the knowledge structure $K(S)$ modified to $K(S + \Delta S)$ by the increment of information ΔI. (p. 253)

Comments

Like the notion of transfer, the linking function is too imprecise and too general to serve as a description of the domain of information science. In addition, it suggests the action of an intermediary but not the action of the user.

7.7. Definitions about Objects and People: To create and transfer

This set of definitions encompasses related terms such as generation, production, discovery, dissemination, distribution, and packaging.

Taube, 1952:

> Documentation as the designation of the total complex of activities involved in the communication of specialized information includes the activities which constitute special librarianship plus the prior activities of preparing and reproducing materials and the subsequent activity of distribution. . . . To the extent that responsibility for preparing primary materials is corporate rather than individual and to the extent that the initial preparation is guided and determined by the ultimate purpose of distribution to a special audience, I think that preparation of the document is a part of documentation. (p. 166)

. . . .

[We] would argue that documentation is a unity, that the common purpose of communication pervades a total complex of activities, each one of which makes its contribution to this purpose and is functionally dependent on the other activities in the complex. What we publish is determined by recognized distribution needs; how we publish is determined not only by distribution needs, but by the requirements of identification and organization; how we identify and organize materials is determined by the kind of publication and the requirements of distribution, etc. (pp. 166-167)

Salton, 1969:

Information science deals with the problems of information handling.

. . . .

The main information handling operations are the production and collection of information items, starting with their initial generation; the analysis and transformation of information, including editing, printing, and/or publishing, as well as indexing, cataloging, abstracting, and summarizing of information; the organization and storage of information, including classification and deposit in data banks, libraries, and information repositories: the encoding and transmission of information from originating points to desired destinations; and finally, the retrieval of information in response to information requests, and the dissemination of the retrieved data. (p. 111)

Koblitz, 1978:

[Taking] into account the emergence of communication science it is essential to start conceptual shaping of at least two disciplines concerned with scientific information which should be developed to meet social needs, namely:
(1) Information and documentation science (this name being widely used in the GDR [German Democratic Republic] and some other countries) which can be defined . . . as an "object science" (its subject field being information and documentation, i.e. documentalistic information), . . . (p. 19)

. . . .

(2) Information science (called so in the GDR and some other countries). In this case, information in its most general sense is viewed as a philosophical category and, consequently, philosophy is faced with the task of investigating information characteristics, structure and regularities of motion in the most general meaning. (p. 20)

. . . .

Information and documentation is a working field of socially organised information activity whose special tasks include the generation, storage, retrieval, dissemination, and promotion of information about new knowledge, experience, concepts, hypotheses, forecasts, etc., in all spheres of human activity. The generation of such information is mainly carried out through analysis and

> synthesis of information sources contents, in particular of primary documents, and is called "documentation". The results obtained are termed "documentalistic information" . . . regarded as a variety of social information; . . . (p. 23)
> . . . .
> The term "information and documentation" should, therefore, be taken as synonymous to "documentalistic information", so that "information and documentation science" should be interpreted as "the science of documentalistic information". (p. 27)

Comments

The function of creativity or discovery is interpreted in some of the additional literature in a rather idiosyncratic manner peculiar to the literature of information science. Klempner (1969), for example, refers to the 'conceptualization' segment of information science as follows:

> [The] product of conceptualization is information.
> . . . .
> Activities in information science employing the conceptualization process may be said to include: indexing, abstracting, classification, thesaurus-building, subject-heading work, document selection, development of interest profiles, and a number of other similar activities.
> . . . .
> Information science can and does concern itself with the <u>physical</u> attributes of symbols and signals, their production, storage, transmission, and manipulation. This segment of information science I have labelled the <u>Storage/Transmission Segment</u>. (p. 340)

Similarly, Wersig and Seeger (1975) referred to "the production of information messages for the user", by which they meant in particular acquisition, cataloging, storage, indexing, abstracting, editing, retrieval, lending, "synthetic information services," and "re-packaging" (p. 25).

On the other hand, Hoshovsky and Massey (1968) took the information scientist as the "producer", "the contributor to the organized

body of knowledge" (p. 47).

The concept of creativity, discovery, or production of knowledge or information is the logical function of researchers, philosophers, artists, authors, and the like. The "creation" of bibliographic access to information and documents does not constitute knowledge discovery or document production. The selecting of symbols to represent newly-acquired documents or information is, although an admittedly creative and intellectual activity, not the product of research. The product of symbol selection, as in the indexing and reference functions, is a bibliographic descriptor, while the product of research or intellectual inquiry in general is new knowledge.

The inclusion in the domain of information science of the creativity function would make information science the domain of all information and knowledge production or of all document generation, depending on the nature of the object treated by the domain. The confusion in this set of definitions, as was mentioned in the earlier sections 5.5. and 5.6., is between study and practice, between the analysis of an object or function and being engaged in doing something with respect to that object or function. The study of information generation is not in the same domain as the generating of that information. Kazantseva and Ursul (1977) argued that scientific information work, as they called the domain, should not undertake to generate new scientific and technical information, which they took to be the function of scientific disciplines.

> Otherwise the specialisation of SIW [scientific information work], its separation inside the system of SW [scientific work], would be senseless. SIW should not supplant applied science and the development sphere; it must serve them and help them raise their efficiency. (p. 7)

Similarly, production taken as physical is quite distinct from both bibliographic creativity and cognitive discovery; physical production is the domain of publishing, in the larger sense, or printing or typing, in the smaller.

7.8. Definitions about Objects and People: To create and use

This set of definitions includes such terms as generation, production, exploitation, application, and utilization.

Symposium on Education for Information Science, Working Session Group 1, 1965:

> The universe of discourse of information science is a set of both long and short duration messages which contains at least one LD message. The emphasis is on LD messages because of their physical convenience and because these involve the delegation of message use. . . .
>
> Information science is particularly concerned with stored or recorded messages, their creation as distinguishable marks or documents, their propagation and use. The discipline has two characteristics of science: a pure science component which inquires into the subject without regard to its application, and the applied science component which develops into services and products.
>
> Important facts in use of records are the physical, psychological, and psycho-physical constraints on the user. In particular, the rate at which recorded marks (information) can be intellectually processed is an important factor in information storage and retrieval and in education. (p. 171)

Kubátová and Fogl, 1976:

> Information science extracts from among the many processes occurring in human society with all its diversity and dynamism of development the process of circulation of specialised information and studies this process--which constitutes one of basic preconditions of the development of society--from the standpoint of optimising processes of decision-making, planning and management. Thus the subject area of information science is the process of generation, transmission, transformation and application of specialised information in society which we refer to as the social information process. (p. 24)
>
> . . . .

. . . .
The main output of the applied part consists of a set of working methods and procedures related to the production of technologies pertaining to concrete information systems.
. . . .

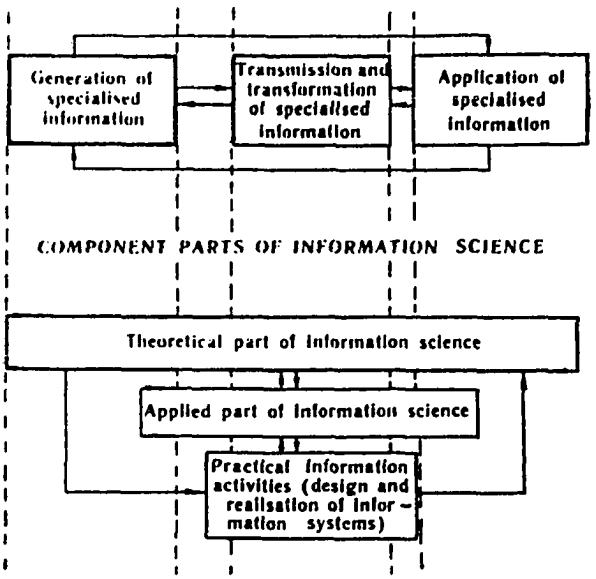


Fig. 1. Plan of the social information process (p. 25)

Wilson, 1981a:

'Information science' is defined here as that set of practices and related disciplinary studies which is concerned with the generation, transmission, organisation, storage, retrieval and use of information together with studies of the user of information.
. . . .
This view of information science is derived from the belief that the phenomena open to investigation are qualitatively different at different places in the field described. . . .
. . . .

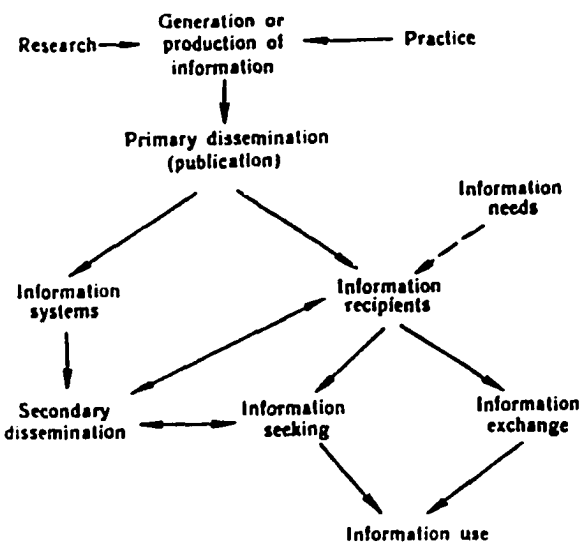


Fig. 1 (p. 13)

Comments

This set of definitions further enlarges the conception of the domain to encompass not only creation but also use of objects. Again, the conflation of study and practice results in an inappropriate characterization of the domain, for the use of information or knowledge is the province of users and creators and so is outside the social domain of information science.

The notion of use is not unambiguous in the definitional literature, as well. Klempner (1969), for example, has taken the "utilization segment" of information science to include such activities as relevance assessment, management appraisals, evaluation of community satisfaction or the satisfaction of national or international cultural, ethical, recreational or socio-political goals (p. 341). This is of course contradictory to the mainstream literature on the utilization of knowledge.

7.9. Definitions about Objects and People: To use

Included here are terms such as to exploit, to facilitate use, to enhance use, and to utilize.

Otlet, 1907:

> By documentation is meant to-day the putting to use of all of the written or graphic sources of our knowledge, such as are constituted by documents of all kinds, especially printed texts. These documents comprise all of that which represents or expresses, with the help of whatsoever signs (writing, pictures, diagrams, symbols) an object, an event, or an impression.
> . . . .
> Supported by an integrated and timely documentation (libraries and collections), helped by instruments of research (bibliographies), exercised according to rational and reflective processes (criticism of sources) the documentary method permits truely the collaborative assistance of all who have worked previously on the same questions. (quoted by Rayward, 1967, p. 262)

Jackson and Wyllys, 1976:

> But one can say that information science has a theoretical side, consisting of studies of what information is and how it can be used, and an applied side, concerned with practical techniques for assisting users of information. (p. 171)

United Nations Educational Scientific, and Cultural Organization, 1980:

> In the present context, informatics encompasses fields related to design, construction, evaluation, use and maintenance of data processing, storage and communication systems including hardware and software, as well as organizational and human aspects. Thus informatics in this sense includes what is often called computer (or computing) science, its technological and theoretical foundations, as well as its applications. (pp. 11-12)

Comments

As the previous section indicated, the function of using information or knowledge is in the domain of users, researchers, authors, and the like. The logical difficulty is the conflation, once more, of study and practice; the study of knowledge utilization, for instance, is quite distinguishable from applying knowledge to a problem.

7.10. Definitions about Objects and People: To evaluate

This is a relatively infrequent conception in the definitional literature of information science.

Bello, 1960:

> [There is] a new professional class called "information scientists." Every research team working on a major problem is assigned an information scientist whose whole job is to master and critically evaluate the mass of pertinent literature. (p. 166)

Tague and Carroll, 1973:

> In addition, the time is upon us when information scientists

> must abandon their passive role as acceptors of information and add to their activities of collation, storage and retrieval the functions of active acquisition and of purposeful and imaginative dissemination. Intelligence operations and those of news media, especially the business press, provide models in which information specialists, differentiated according to the orientation of the user, actively approach information generators to acquire timely, authoritative information and implicitly superimpose critical judgment upon it. Nor should the advertising and communications arts fraternities be the only ones to package information in the most attractive and useful manner before its dissemination. This too is among the neglected functions of the information specialist. (p. 42)
>
> . . . .
>
> But . . . we are not out to propagandize, pander, palliate, or titillate. We see it as the function of the information scientist/specialist to tell it 'like it is' and the name of the game is involvement. Finding out what the members of the community served want to know, acquiring that information, and marshalling our skills in information science to structure and display it in the manner most useful and acceptable to our community.
>
> We do not assert that the kind of information centres described here do not exist. They do. Stockbrokers have them, as do police, airlines, credit bureaux, oil companies . . . but information scientists, by and large, aren't involved. (p. 44)

Simpson, 1979:

> [The] term 'Information Science' was concerned with information within the field of science, and an 'Information Scientist' was looked on as 'primarily a scientist capable of evaluating the information he gathered and of exercising an advisory function'. (p. 50)
>
> . . . .
>
> [By] the late 1940s, there was a strong and growing body of people who variously called themselves information officers, intelligence officers, documentalists, etc., who made use of comprehensive specialised collections of various types of documents and bibliographic aid to supply their users with dynamic information services. The emphasis was on the exploitation of published and unpublished material, facilitated by a thorough knowledge of the subject matter and a clear awareness of the needs of the users. (p. 49)

Comments

The function of evaluation, like that of creativity and utilization, is not in the domain of information science. Such a function

is logically inseparable from utilization, for whatever is used has been evaluated by the user for its adequacy to the intended use, whether the evaluation is explicit or presumed. Mikhailov, Chernyi, and Gilyarevskii (1969) held that:

> It should be emphasized that informatics is not concerned either with the determination of truth or falsehood of information, nor of its novelty, usefulness, etc. (p. 14)
> . . . .
> Nor is informatics concerned with the logical processing of existing information with the purpose of obtaining new information not contained, in an apparent form, in the initial information. Evidently, such logical processing of scientific information, as well as the evaluation of its quality are impossible unless facts, laws, and the theory of the science to which it belongs are utilized. If we considered these tasks as lying within the scope of informatics, we would have of necessity been compelled to declare informatics a science of the sciences, which is of course absurd. (p. 15)

Some of the definitional literature of information science has taken the term evaluation to signify indexing and classification, but this is a confusion of meaning and symbols. Indexing and classification are the activity of determining appropriate symbols to stand for other symbols; no evaluation of the adequacy of the symbols in reflecting reality, knowledge, information, or objects is involved.

Moreover, the activity of evaluating users' information requirements, of evaluating information systems, or of evaluating document collections is part of the domain of information science, and is not to be equated with evaluating information.

It is curious that another inappropriate function is often coupled in the definitional literature of information science with the evaluation function. This is translation, which is logically the responsibility of translators; translation and indexing are distinct and separate functions in distinct and separate domains of social practice.

7.11. Definitions about Objects and People: To manage or control

Among the many synonymous terms of this set of definitions with respect to management or control are the following: to plan, to design, to operate, to direct, to command, to monitor, to engineer, to construct, to manipulate, to organize, to administer, and to make policy.

Mooers, 1963:

> The phrase "information science," like the term "documentation," is more an expression of hope or a slogan to rally around than it is a name of a profession. Even before documentation has been well defined, we find that "information science" was created to remove the restricting notion that only documents are of interest. However, there is a real need for a new discipline. Both the scientist and the businessman desire assistance in the mechanics of dealing with information.
> . . . .
> In my view, the task of the information scientist will be to help others to create and build information systems. These systems will be large and small. He will help individuals to create various small private files. He will show groups how to keep their information. And, he will knit these together with the large company and nationwide information networks. . . . If this view is correct, perhaps the designation "information systems engineer" would be a more correct description of the emerging profession. (p. 127)

Slamecka, 1975:

> The imminent societal imperative, management of knowledge as a social resource, appears to be a viable new framework for defining major roles and tasks for theory-oriented work in information science. (p. 318)
> . . . .
> There is indeed in the offing a formulation of a problem domain . . . the management of man's knowledge as a social and national resource. Instances of rising social awareness of this problem domain are already with us: the issues of the value and propriety of scientific knowledge; the conscious commitment to the machine-aided optimization of human problem solving and decision making; the smoldering problem of the low efficiency of systems and organizations for human learning; the dilemma between the common good and individual privacy; . . . It is a problem domain which signals and accompanies the impending transition of the industrial society to a post-industrial, knowledge society. Hence, it is not a universal imperative, ... (pp. 319-320)
> . . . .
> [The] information research community should . . . shift from a preoccupation with document housekeeping and delivery mechanisms to the related, but much broader, problem domain that is based on the need to discover the principles of (and to develop the means for) the optimal husbandry of one of man's key resources, knowledge. (p. 320)

Yurow, 1981:

> To some, information policy is synonymous with information management. More precisely, information management is merely a significant aspect of information policy.
>
> . . . .
>
> Information management not only deals with the need of individuals and organizations to convert data into information, but it also deals with the problems of getting the right information to the right people at the right time and in the right form. Problems of information glut and information scarcity are aspects of information management. Other aspects of information management include information redundancy, faulty information, unreasonable information collection and reporting burdens on those sources from which an organization requests information, and excessive costs of handling information within an organization. (p. 30)

Comments

The function of managing or controlling something does not convey an adequate conception of a domain of information science. Buckland (1980) suggested that the currently fashionable term information management was "of limited usefulness in terms of detail" (p. 370). Cook (1976) criticized the new national problem domain offered by Slamecka (1975), "the management of man's knowledge as a social and national resource," as a very fuzzy statement which was nowhere defined (p. 16). Wilson (1981) has noted the weaknesses issuing from the use of the term "information manager" as an alternative to the use of librarian.

> Information manager can have more than one referent, which leads to confusion. It could describe a function rather than an occupation, as in the case of a person who processes information to make it accessible. It could refer to an information officer who interacts with the media on behalf of an organization. It could mean someone who is the chief administrator of an information agency. The ambiguity of the term manager has already received attention in the literature. Persons using the name information manager are asking what the term means. They are also seeking job clarification and complaining about lack of status. (p. 325)

Moreover, the range of activities encompassed by the function of management, that is, planning, organizing, coordinating, directing, controlling, and supervising, does not identify a distinctive domain of information science; managerial functioning is involved in a wide variety of enterprises.

Finally, the notion of managing information or knowledge involves controlling and directing ideas, and so goes far beyond an acceptable domain of political policy and social ethics. Also, since information or knowledge is taken as ideas, the management and control of ideas would require the management and control of human beings.

A contradictory and much narrower conception of information management, distinct from his characterization of knowledge management, was offered by Weiss (1977):

> Information management refers to efficient bibiliographic organization and inventory control. Knowledge management refers to the principles, policies, and practices for guiding and controlling, in a socially and technically optimal sense, the generation, distribution, consumption and effect of this resource [knowledge]. (pp. 3-4)

This conception of information management continues the tradition started by Shera and Egan in the late 1940's of referring to classification and cataloging as either 'bibliographic control' or 'bibliographic organization'. These terms, however, are taken to signify one element in the domain, but not the whole of it. This usage of the term 'information management', then, as the conceptual descendant of bibliographic control and bibliographic organization is flawed, and not consistent with their typical designations in the scholarly community at large.

To Svenonius and Witthus (1981), information management is associated with organizatonal management.

> Managing information in an organization means harnessing information technologies, reducing paperwork, and rationalizing the flow of information. (p. 292)
> . . . .
> The information management paradigm is a framework within which systems personnel, records managers, and special librarians conceptualize role change. (p. 296)
> . . . .
> Signifying that we have entered this age [of an information-centered economy] is the emergence of the information management paradigm within which the management of information is linked to improved business productivity. (p. 307)

A number of theorizers about the relationship between management in general and information have argued that decision making is the conceptual link between them. Whittemore and Yovits (1973) defined information as "data of value in decision-making" and further asserted that:

> An implication of this definition then is that information is used only for decision-making and that the decision maker has only the resource of information available to him. Thus, information and decision-making, which might be defined to be purposeful activity or intelligent behavior, are very closely bound together, if not totally inextricable. (p. 222)
> . . . .
> Information resolves or reduces uncertainty. Uncertainty is the critical link between information and decision-making.
> . . . .
> In a general way we may equate decision-making to problem-solving. (p. 224)

It is curious that so little attention to the concept of data has been given in the literature by Yovits and his colleagues, since their notion of information is defined in terms of their notion of data. Yovits (1969) indicated that data are "transformations of observable actions", measurements that have been made on physical quantities.

> Data . . . are absolute and are related directly to the observables, independent of the system or uses under consideration.
>
> It is very important to note that information is a relative quantity and cannot be defined except in terms of a specific situation with a specific set of observable actions. Then, and only then, can we define a quantitative measure for information.

> Data, on the other hand, are absolute and are related directly to the observables, independent of the system or uses under consideration. (p. 374)

Here in the mistaken assertion of data as absolutes is the rampant empiricism that mature science has discarded. Data are not absolute, for they are grounded in theory, in prior ideas; indeed, data are the means by which empirical suppositions are tested and evaluated. Data are sensed ideas, conceptual manifestations, and so are theory laden. Grounded data and grounded theory are inseparable links in empirical research. Jacob (1982) has noted:

> Whether mythic or scientific, the view of the word that man builds is always largely a product of his imagination. For, in contrast to what is frequently believed, the scientific process does not consist merely in observing, in collecting data and deducing a theory from them. One can watch an object for years without ever producing any observation of scientific interest. Before making a a valuable observation, it is necessary to have some idea of what to serve, a preconception of what is possible. (p. 11)

Similarly, Steiner Maccia and Maccia (1969) criticized the "data focus" issuing from Baconian inductivism:

> At least two inadequacies in the Baconian way are patent. First, data cannot be treated in an atheoretical manner. One must make sense of data. The particulars or instances of the world do not arrange themselves. The instances under consideration must be sorted and related. A researcher must bring a system of terms or theory to the data. Because many researchers do not make explicit the theory they are utilizing does not mean they are operating atheoretically. It simply means that it is difficult to know what they are about. Secondly, theory must go beyond data and so cannot arise completely from data. Theory to be adequate must have predictive power, i.e. power to make sense out of data yet to come. An adequate theory must be open not closed. (p. 46)

With reference to the introduction of the concept of uncertainty into the decision-making and information focus, Roberts (1976) observed that one definitional problem had been replaced by another:

> Uncertainty as a concept has all the intractability and elusiveness associated with information. (p. 251)
> . . . .
> Indeed, the introduction of decision making into the definitions not only narrows the social horizons of information science but also creates additional problems of definition and measurement. It must be said that the authors are in no doubt regarding the position to which such arguments lead.
> . . . .
> [Yovits and Whittemore] have failed to demonstrate either the practicality of their ideas in working situations or the possibility of further theoretic development. (p. 253)

He concluded that:

> [It] would seem, unhelpful, to say the least, for information science to manufacture its own version of economic man in the shape of uncertainty man and to adopt him as the basis for the exploration of information problems. (p. 252)

In this regard also, decision making involves axiological considerations; questions of values, effectiveness, objectives, and ethics must be addressed if a decision is to be logically adequate, that is to say, if reasons for it are to be available and defensible. Hamlet's dilemma was how to decide between right and wrong; no amount of information taken to be empirical information could have aided him in his indecision. Empirical decision making does not suffice where ethics and objectives are to be treated.

With respect to the relationship between knowledge and decision making, Rich (1979) has pointed out that:

> Not all decision-making lends itself to the full and open use of information/research resources. For example, when a manager is engaged in negotiations, research probably will not be the critical input in the decision-making process. Indeed, a manager needs to consider the goals/objectives of the organization and the trade-offs that are necessary to reach these goals.
> In some areas of problem-solving (such as negotiations, or meeting constituency or pressure group interests) one should not be surprised to find that information is not being used--at times, it is being actively rejected. One must remember that the research process is different from the management/political process; there are different stakes and constituencies involved. More importantly, there are different standards which apply to what constitutes a

> successful outcome. Many scholars would characterize a successful outcome as one that was "scientifically rational." Most managers would characterize it as one which met the goals of the organization, minimized costs, and brought maximum gain to the organization. The two outcomes need not be the same. (p. 24)

Finally, Machlup (1979) wrote that:

> Among substantive questions, what struck me most [at the 1978 NATO Institute in Information Science, in Greece] was the proposed restriction of information and information science to the facilitation of action. This represents, in my opinion, a reversion to extreme pragmatism. The overwhelming part of human knowledge, and of the information processes by which it is distributed, is not action-oriented. Instead, it serves to teach, to please, to entertain, to improve skills, to satisfy curiosity, and to induce a more refined style of living. I can understand that information specialists with a background of service to the military establishment and to business management think chiefly in terms of "informed" decisions and actions. They should not insist on impressing their point of view on those who have other objectives in mind. (p. 112)
>
> . . . .
>
> The theoretical constructs of consciousness, the human mind and free will are, I submit, indispensable intervening variables in the explanation of human action induced or facilitated by information. (p. 113)

Thus, whether management and control are taken to signify the very narrow bibliographic organization, the traditional organizational notions, or the very broad problem-solving framework, this function can not be said to describe adequately the domain of information science.

7.12. Definitions about Objects and People: To mechanize

This set of definitions includes such terms as to automate, to computerize, and to formalize.

Gorn, 1963:

> It is the belief of the author that a new basic discipline

is emerging which might be called "The Computer and Information Sciences". This field makes application of concepts from the traditional fields of mathematics, philosophy, linguistics, psychology, engineering, management science, library science, etc. . . . Examples of general topics of study in it might be programming systems, computer system design, artificial intelligence, information retrieval, etc. The probabilistic information theory of Shannon clearly belongs to this area, but there is a theory of mechanistic information and its processing which must also be included. Thus a central topic in the new discipline would be the synthesis and analysis of mechanical languages and their processors. (p. 150)

. . . .

The study of mechanical languages is concerned with the synthesis and analysis of systems of arrangements of symbols, and with the synthesis and analysis of processors which generate, recognize, translate, and generally interpret such systems in various ways. (p. 151)

. . . .

The Computer and Information Sciences does consider the pragmatic question of the relation of symbols to users and interpreters a central issue, even as linguistics, psychology, philosophy and engineering must.

Thus a student of numerical analysis who designs or studies an algorithm is thinking like a mathematician if his only concern is its existence or validity. He is thinking like a computer and information scientist if he considers it a processor and is concerned with its efficiency, timing and control, tabular layout or storage allocation, etc. In the latter case his concern is not purely extensional, as the philosophers put it; he is concerned with the 'intent' as well. (p. 153)

. . . .

Finally, a student of an abstracting and information retrieval system might be thinking primarily like a linguist, like a library scientist, or like a computer and information scientist. It all depends on whether his primary concern is with whether humans act that way, or whether they could act that way, or whether the recipient of the information may not even be human. (p. 154)

Landry et al., 1973:

[We] believe the definitions presented . . . [below] form the starting point for the development of a unified theory of computer and information science.

. . . .

Machine: A machine is a black box that accepts inputs and emits outputs.

. . . .

Anything which can be observed can be treated as a black box.

. . . .

The observables associated with a machine, that is, the inputs and outputs of the machine, are all-important. . . . Perhaps the most graphic way to illustrate this fact is to note that no object could be seen (sensed optically) in the absence of light. . . .

> Thus, the blind person is a machine for which light is an input only in the sense that the machine absorbs and reflects the light just as a rock does, but for which the light does not constitute an input through which the machine itself can visually distinguish other machines. The faculty of sight is so taken for granted that all machines that possess it fail to realize that their operation is controlled to a great extent by visual inputs. (p. 330)
>
> . . . .
>
> System: A system is a collection of machines chosen for measurement. (p. 340)
>
> . . . .
>
> Upon making a decision, a machine will have chosen a course of action which it then pursues. This choice is called a decision. That is to say, a decision is said to have been made when the machine begins carrying out a course of action. (p. 340)
>
> . . . .
>
> The input (observables) which enable a machine to choose among alternative courses of action is called information. Thus we say that information consists of all those observables which cause a machine to decide upon a course of action. (p. 341)

Slamecka and Ralston, 1976:

> More recently, the preoccupation of applied information science with the control of recorded information and communication in the scientific sector has been broadened to encompass concern with information handling in other professions as well: management, education, medicine and health care, government, law, the military, and others. The initial premise of applied information science--that the cost effectiveness of scientific and engineering work can be raised by improving the communication among its practitioners--has been formulated into a broader assumption: that the cost effectiveness of the human information processes which characterize these professions (e.g., problem solving, decision making, learning, etc.), can be significantly improved through their formalization and gradual delegation to symbol processing machines. (pp. 656-657)

Comments

The extremist view of the mechanization function reduces the human being to a narrowly deterministic entity whose entire consciousness is filled with simple sequential cognitive moves. The larger conception of cognition that would encompass rationality, creativity, imagination, insight, altruism, compassion, understanding, and wisdom, is suppressed and so are other dimensions of the human being: the

affective and the conative, that is, emotions and intentions. It is uncertain from the definitional literature whether the new super-machines are to become human in all of the dimensions so designated, or whether the theoretical descriptions have used flawed language. Otten and Debons (1970), for instance, asserted that: "All information processing operations can be performed by digital computers" (p. 90). Hays (1971) stated that a computer could "take part in a conversation" and "explain--that is, give a unified account of--the facts" and "become a colleague, possibly interesting to discuss problems with" (p. 7). Landry et al. (1973) wrote of the machine "choosing among alternative courses of action" and "making a decision" and "pursuing a course of action" (p. 341).

Rosenberg (1972) argued that:

> [The] computer is in no way an analog to the human brain and thus cannot perform any but the simplest of tasks normally considered part of the human intellect. This view is gaining wider acceptance, but is hardly widespread. (p. 102)
> . . . .
> The fact that computers perform functions normally performed by the human brain is not reason to believe that they are structurally similar. The same analogy prevails between a steam shovel and the human with a shovel. This realization is more than just a change in the view of the computer; it is a change in the view of science and the view of man. Machines will no longer be compared to men (machine-like indexing by people) but machines to machines and men to men. In information science, this will signal a more realistic view of what computers can do. It will, hopefully, show the way to solutions for problems by setting the basis for genuine man-machine interaction. The interaction will not be trivial human response to a computer dominated system, but a computer response useful to a human system. (p. 103)

Crick (1979) wrote:

> Unfortunately the analogy between a computer and the brain, although it is useful in some ways, is apt to be misleading. In a computer information is processed at a rapid pulse rate and serially. In the brain the rate is much lower, but the information can be handled on millions of channels in parallel. The components of a modern computer are very reliable, but removing one or two of them can upset an entire computation. In comparison the neurons

> of the brain are somewhat unreliable, but the deletion of quite a few of them is unlikely to lead to any appreciable difference in behavior. A computer works on a strict binary code. The brain seems to rely on less precise methods of signaling. Against this it probably adjusts the number and efficiency of its synapses in complex and subtle ways to adapt its operation to experience. Hence it is not surprising to find that although a computer can accurately and rapidly do long and intricate arithmetical calculations, a task at which human beings are rather poor, human beings can recognize patterns in ways no contemporary computer can begin to approach. (p. 219)

The mechanization of human information functioning is a logically inadequate conception, for machines do not generate or evaluate information; they merely transform data elements. The reduction of human beings to computers is not only inappropriate for the domain of information science, it is inappropriate for any domain of research and social practice. Furthermore, mechanization without social and political evaluation, without ethical standards brought to the activity, is logically inadequate, for the desirability and effectiveness of objectives must be treated.

7.13. Definitions about Objects and People: To study

This set of definitions focuses on investigation and analysis and ignores the functional domain of social practice.

Kochen, 1965:

> Information systems are found in insitutions, in individual living organisms, in entire cultural communities and, presumably, the same principles may be underlying the functioning of the information system of all these. The study of such principles may in several decades emerge into a new scientific discipline from current concepts and methods in theory of automata, computer programming techniques, and communication theory and certain aspects of behavioral science (sociology, cognitive theory). (p. 41)
> . . . .

It seems fruitful to view the information system of an organism to perform three basic types of tasks. 1) Maintenance and use of an internal image of relevant aspects of the natural environment of the organism for purposes of guiding behavior, 2) Maintenance and use of a store of records for purposes of externally representing internal images to facilitate social communication, 3) Building and improving both the internal image and the external store of records based on information from the environment and from the store of records.

In concrete terms, an institution, like Harvard, is here viewed as a living organism. The three functions of its information system may be embodied in 1) the total understanding within the entire Harvard intellectual community, 2) the Harvard library system, 3) the actual community of scholars affiliated with the university. (p. 42)

Mikhailov, Chernyi, and Gilyarevskyi, 1974:

Since the Anglo-American term 'information science' may tempt one to interpret it in a broad sense, i.e. as a science dealing with all types of information, with information in general, we deem it necessary to emphasize that the word 'information' in this term [informatics] stands for scientific information only. (p. 54)

. . . .

Informatics is a scientific discipline studying the structure and the general properties of scientific information, as well as the regularities of all processes of scientific communication . . . carried out both through formal channels (i.e. through scientific literature), and through informal channels (personal contacts between scientists and specialists, correspondence, exchange of preprints, etc.)

Informatics is a social discipline, as it studies phenomena and regularities inherent in human society only. (pp. 54-55)

. . . .

Of all the properties peculiar to scientific information we have selected twelve which, we believe, are the most essential, and arranged them from the more general to the more specific. These properties include the following: inseparability of scientific information from its physical carrier; nonadditivity, noncommutativity and nonassociativity of scientific information; presence of value; social nature; semantic and linguistic (logical) nature; independence from the language it is expressed in and from its material carrier; discreteness and cumulativity; independence from producers; aging; and scattering. (p. 57)

. . . .

Scientific information is semantic. This means that it is conceptual, as it is concepts that make up the meaning of words and generalize essential features of objects and phenomena. (p.62)

. . . .

The invariance of scientific information in relation to the languages in which it is expressed and to its physical carriers, is not a universal feature of any type of information. For instance, aesthetic information depends considerably on the language it is expressed in, and on its physical carrier. (p. 65)

Brookes, 1978:

> Informatics would thus become the study of the interactions between the external world and living organisms over the whole spectrum of information processes. But one of the first practical outcomes of such studies would be the well-founded information systems that will eventually supersede the inefficient document-retrieval systems in operation today.
>
> . . . .
>
> One feature of my approach that I regard as necessary is that theoreticians switch their analytical interests from concern to improve the performance of Stage I systems by analysis of subjective knowledge structures to analysis of the public knowledge structures inherent in our data-bases. We thus escape the dilemmas posed by subjectivity for more than 2000 years by focussing attention on the integration of the 'information content' of the data-bases which lie fully open to scientific study. (p. 28)
>
> . . . .
>
> I regard information as that which modifies a knowledge structure in any way. Some of the modifying information comes to us by direct observation of our surroundings, some from what others tell us (though less than our teachers like to think), some from reading; but there may well be other sources of which we are not consciously aware. All information which modifies a knowledge structure is the result of an information process. The knower sees, hears, tastes, smells or feels something. (p. 21)

Comments

The definitions of the domain of information science as a study rather than as a study and practice, or as the study of a practice, is too narrow. Moreover, many of the terms are ambiguous, for instance, functions described as 'to deal with', 'to be concerned with', or 'to be concerned about'. Licklider (1973) argued that:

> Let me propose, at the outset, that for our purposes we reject the notion . . . that information science is the science of information. The domain of information is too extensive for this small group to master or to govern. Why should we stake a claim, at this late date in the history of science, to territory occupied so long by logicians, mathematicians, psychologists, and artists, not to mention propagandists, spies, and many others whose subject is information. (p. 165)

Along similar lines, Wilson (1981) has asserted that the notion of the information professional "has no real meaning, no specific referent"

(p. 325). She wrote:

> Professional in what profession? Information is not a profession nor an occupation. Neither is it a discipline. By way of contrast even though the dimensions of information science are not entirely clear nor its claim to being a science fully established, it has achieved some recognition as a discipline. (p. 325)

Buckland (1980), however, took issue even with the scientific claim of information science:

> To begin with, study of the whole realm of information studies--described elsewhere as "all-embracing information science"--would have to range over linguistics, philosophy, psychology, education, mathematics, librarianship, some sorts of engineering, neurology, cybernetics, and many other areas. We can be inspired by this "all-embracing" definition of information studies, but in practice we have to concentrate on specific features of it. . . . At present, saying that one is an "information scientist" is not, in itself, very informative. (p. 370)

Finally, Roberts (1976) pointedly argued that:

> All the social sciences draw the necessary distinction between theory and practice without conceding the need to reserve the title 'science' for their 'fundamental', theoretical interests. There seems no good reason why a social discipline such as information science should be any different. From this viewpoint it is possible to appreciate the essential complementarity of fundamental and practical activities and the particular importance of action-explanations in individual terms for purposes of general explanation (e.g. the meaning of events), for direction (e.g. in the design of information systems) and for verification (e.g. testing hypotheses or assessing the effectiveness of systems). (p. 256)

Information science is, or should be, he asserted, "a social discipline with practical ends" (p. 252).

Indeed, the minimal criteria for an adequate conception of the domain of information science are seen to be the specification of a study of a clearly identified social function which treats in some fashion a specified universe of objects for some uses by human beings.

8. Summary Evaluation

In his annual report for 1974, the editor of the Journal of Chemical Documentation announced that the journal would henceforth be known as the Journal of Chemical Information and Computer Sciences. He observed that:

> Ostensibly, the new name is not the best of all possible names. It is longer than we would like it to be, yet two words shorter than Journal of Information Science and Computer Science in Chemistry, which is what the new name really means. The new name has the advantage that the two terms, "information science" and "computer science," can mean almost anything one wants it to mean. Thus the new name is considerably less restrictive than the concept of "chemical documentation." (Skolnik, 1975, p. 2)

Although the observer did not appear concerned about the lack of logical rigor associated with the term 'information science', his comments are an indictment that has accompanied its usage in the definitional literature over the past fifteen or more years. The conceptual terminology of information science and its antecedents has emerged as a rhetoric of labels. Information phlogistics is still with us. Indeed, critics and analysts of the conceptual terminology find themselves at a severe disadvantage, for they must shoot at moving targets of conceptualization: conceptual slippage and conceptual chaos are their bull's-eyes. There are no collectively satisfactory notions in the definitional literature of information, knowledge, systems, or functions in the domain of information science. There is no agreement on the proper elements of the domain.

This chapter has examined 695 definitions and has identified nineteen distinct generic functions purporting to characterize information science. The generic functions have been described, at the very minimum, by 130 synonymous, quasi-synonymous, and pseudo-

synonymous terms. The generic functions have been applied to objects alone, to persons alone, or to both objects and persons. The domain has been characterized as a social one, as a psychological one, as a biological one, as a physical one, and as any combination of these dimensions. The object of the domain has been taken not only as information in all the interpretations previously mentioned, not only as knowledge in many diverse interpretations, not only as data in many diverse interpretations, but also as documents, documented information, verified information, authenticated information, new information, scientific information, science information, documentary scientific information, informative communication, documentary communication, stored information, recorded information, recorded informational materials, store of learning, textual form, records of intellectual activity, records of all kinds of intellectual activity, the totality of what is crystallized from human thought, facts, ideas, messages, scientific and technical periodicals, existing literature, graphic records, and signs and symbols. Circular definitions abound, and in particular information, which is typically defined in terms of data or knowledge while data and knowledge are left undefined. In many instances, elaborate mathematization has preceded elementary conceptualization. And yet there are theorizers represented in the definitional literature who argue that conceptual consensus in the scholarly and professional community does indeed exist.

More rigorous critics have rejected such an argument, however.

Rees (1965) wrote that:

> The heterogeneous origins of the researchers and teachers of information science are at once both a cause and product of the lack of definition of the field. The numerous attempts to define information science have reflected essentially parochial viewpoints. It is not surprising that researchers have endeavored to crystallize information science around their own discipline(s). In this manner it is assumed that information science is librarianship in greater depth, linguistics writ large, and so on. The temptation to pour information science into the mold of one's own expertise and competence is difficult to avoid. Information science exists in the eyes of the many beholders. (p. 72)

Vagianos (1971) wrote that:

> [The] general state of information science is that of a house built on sand, an imposing structure of theory and hypothesis, lacking any clear and common definition. In fact, we have available several dozen complex intellectual statements explicating information science. Many of them disagree, alike only in their lack of validity because of a failure to define the basic axioms of the field. It is not for nothing that most papers delivered at conferences or written about the subject "information science" begin with apologies for a lack of an operational definition, provide a personal definition, or demand that we leave "the slippery slopes of sterile semasiology" and get on to the work at hand. (pp. 19-20)
>
> . . . .
>
> Information science is man-made, our own invention, and we should no longer permit it to gallop in undisciplined fashion or to hide behind the excuses related to the growth pains which every emerging discipline undergoes. We can no longer proceed without generally accepted, concise, operational definitions, and tangible goals. Research personnel may not require such definitions and goals, but all educators and teachers know <u>you cannot teach or train students without them</u>. (p. 31)

Cook (1976), similarly, wrote:

> What has been written is lacking in focus and in cross fertilization of idea. Random thoughts predominate. A concerted attack is missing. Wellisch's [1972] article has not been followed up on; and it seems, therefore, misleading to think in terms of a battle. Tilting at the proverbial windmill seems to be a better description. Wellisch's colleagues have ignored most of the questions that he raised, hoping perhaps that they would fade away. (p. 2)
>
> . . . .

> It should be clear from this essay that in the nearly four years which have passed since the publication of Wellisch's paper, information scientists have made little or perhaps even no progress in dealing with the issues that he raised. Circular definitions have led to arguments that are circular. Everyone talks, few listen and the goal of defining information science, much less elaborating a theory for it, remains elusive. (p. 23)

The conceptualization of the domain of information science in the definitional literature has been frequently too broad. Jacob (1982) has observed that:

> While asking general questions led to very limited answers [at the beginning of modern science], asking limited questions turned out to provide more and more general answers. This is still valid for present-day science. The capacity to judge what problems are ripe for analysis, to decide when it is useful to reinvestigate old territory, to reexamine questions that once were considered as solved or insoluble, remains one of the most important qualities of a scientist. (p. 10)
>
> . . . .
>
> If it is to cover a large domain, a theory must be both powerful enough to explain a variety of events and flexible enough to apply to a variety of circumstances. Yet an excess of flexibility may well turn power into weakness. For a theory that explains too much ultimately explains very little. Its indiscriminate use invalidates its usefulness and it becomes empty discourse. Enthusiasts and popularizers, in particular, do not always recognize the subtle boundary that separates a heuristic theory from a sterile belief; a belief which, instead of defining the actual world, can describe all possible worlds. (p. 22)

Nowhere is weak conceptualization in the definitional literature of information science more apparent than in the treatment of the domain of library science. Typically, there is no reference to it at all, not even a denial of its one hundred year old literature. At best, the references are superficial and incomplete. Efforts to tease apart these disciplinary domains have been consistently inadequate. It is rare to find in the literature a paper that attempts to define both information science and library science; the usual course is to characterize the favored term, to assert its separate identity from the

other, and then to evade further elaboration. Conceptual analysis, however, requires that sufficient evidence be introduced for evaluating the logical adequacy of claims. Conclusions must be warranted and they must be demonstrated to be warranted.

The next chapter deals with such conjunctions of concepts that define the domains of library science and of information science.

CHAPTER FOUR

CONJUNCTIONAL DEFINITIONS OF LIBRARY SCIENCE AND INFORMATION SCIENCE

1. The Published Literature

1.1. Overview

Although the formal structure of this inquiry has so far implied a clear division between the definitional literature of library science and the definitional literature of information science, such is not the case. The present chapter examines all the definitional literature which has attempted to interrelate the concepts of library science and information science. These interrelations have taken a variety of forms, principally efforts to sort out conceptual similarities, conceptual synonymies, conceptual differences, and conceptual underpinnings. Inadequate conjunctions and disjunctions have not been excluded from the examination.

Like the bibliographic control of the theoretical literatures of library science and information science treated separately, bibliographic control of their conjunctions is also inadequate. Only Library and Information Science Abstracts indicates papers which treat both terms, and this coverage is incomplete. Neither the Annual Review of Information Science and Technology nor Advances in Librarianship has dealt with their interrelations.

1.2. Definitions

Of the approximate 445 conjunctional definitions analyzed here, a few have been cited in previous chapters. Their partial repetition in the present analysis is designed to highlight the comparative senses which have been specified in the literature. Glossary definitions are not dealt with again, because no case was found where the compiler attempted to point out the inconsistent and contradictory usages of the domain terms in which we are interested. The glossaries have entertained logically inadequate statements without notice.

The present chapter, then, embraces the relatively few definitions which have more or less explicitly tried to describe the conceptual relationship between the terms 'library science' and 'information science'. It is in the reading of these attempted descriptions that the weaknesses of the definitional literature become most clearly self-evident. The absence of conceptual rigor in theorizing is manifest. There is a lack of a strong citing tradition. There is a penchant to reinvent the "conceptual wheel". There is a conceptual chaos in the definitional literature. These weaknesses may be expressed more simply as the absence of scholarly consensus on domain problems. Intellectual confusion is the norm, not the exception.

This is nowhere more troublesome than in attempting to sort out similarities and differences among the various definitions. Categorization has proven especially difficult because the same definitional criterion was frequently employed in the literature either to demonstrate the existence of two or more domains, or to

demonstrate domain unity. It is patent that such claims are contradictory expressions.

There are further difficulties in analyzing the conjunctional definitions of library science and information science. One of the most common is the use of vague descriptions, such as "more common to", "more concerned with", "much broader than", "more complex than", "more sophisticated than", "newer than", "older than", "more general than", "more specialized than", "more conventional than", "more traditional than", "more innovative than", "more dynamic than", "more intensive than", "related to", "very closely related to", "takes into account", "involves", "includes", "cuts across", "treats of", and similarly imprecise terms.

Another difficulty is presented by the use in the definitional literature of a "junk class" such as "etc.", "and others", "and so on", and "and the like". In these cases, unspecified properties or instances are indicated, but since they cannot be known, they cannot be fitted into existing conceptual structures. There is no advance in theoretical knowledge.

A similar situation arises when examples are presented instead of a definition. Examples, however, cannot function self-evidently in the process of definition. They must be shown, by some backing and justification, to be within the universe of discourse and not in some other universe of discourse. Claims must be supported and justified. An example may be taken as typical of the class, but it is not the class itself; an example is an instance, not a definition.

An illustration from the literature of simultaneous use of

both junk class and examples functioning in place of definition is the following:

> The author eschews use of the phrase "information science," reserving that only for such concerns as general systems theory, cybernetics, artificial intelligence, etc. (Taylor, 1979, p. 365)

Unspecified analogies are a further difficulty in dealing with this definitional literature in a coherent and objective manner. Analogies, like examples, are not self-evident; the reason why two things are considered to be analogous must be specified. Unspecified analogies can not be known and so their adequacy can not be determined. Among this category are the following:

- "Library science is as different from information science as is the study of mathematical principles from the use of arithmetic in cost accounting or space navigation."
- "The goals of information science are as different from those of librarianship as are the goals of doctors different from those of hospital administrators."
- "Without the study of the nature and properties of the knowledge on his shelves or in his computer, the librarian or information scientist is like a surgeon practised in operational techniques and equipment, who knows nothing of the structure of the bodies on which he operates."
- "The analogy of the general practitioner, the medical specialist, the bio-medical research worker can be matched all along the line of librarianship and documentation."
- "It has been suggested that defining library science is rather like a cat trying to define a rat--it cannot, but it knows one when it sees it."

In addition to the conceptual difficulty with unspecified analogies, metaphorical expressions in the definitional literature are similarly difficult to analyze. The more frequent metaphorical usages referred to spectrum, to overlap, or to their grammatical

paradigms. Among the expressions in reference to library science or information science or both are found the following: "a broad spectrum with overlapping regions", "two sets of overlapping spectra", "a continuous spectrum", "a spectrum of labels", "one broad spectrum so wide that the two ends can be seen to be very different", "a spectrum of concerns that are part of one body", "a broad continuum", "an entire continuum", "two areas that impinge on one another as overlapping circles", "at the heart of", "at the vortex of", "the apotheosis of", "an attitude toward", "the parent tree and its branch activities", "the common section of two overlapping circles", "a Venn diagram gone crazy", "a tributary". More extreme metaphors were considered to be: "an information iceberg", "an information-oriented ear", "information infra-structure", "information solar system", "information planets", and "packages of knowledge".

These metaphors do not contribute to the clarification of interrelations between library science and information science because the borrowed notions are not specified as properties or elements.

Equally as common as metaphorical usage in the definitional literature of library science and information science is the straw man syndrome. Expressions encompassed by this category of conceptual difficulty are the following negative descriptions of library science: "traditional concerns", "traditional responsibilities", "traditional librarianship", "traditional libraries", "traditional librarians", "traditional books", "traditional curriculum", "the traditional disciplines", "traditional types", "classical librarianship", "classical librarians", "classical patterns", "conventional librarianship", "conventional library schools", "rigidly traditional librarianship",

"rigidly conventional librarianship", "older more conventional librarianship", "conservatism in essential techniques", "old image of librarians and librarianship", "nineteenth century patterns of library organization and management", "the passive mode", "reactive response", "the old", "standard library practices", "normal library service", "the older profession", "a prescientific discipline", "splendid humanistic isolation", "humanistic librarians", "committed humanist". These negative definitions with respect to library science were infrequently matched by equally negative references to information science. One notable exception was the following comment by Shera (1965):

> The professional education of all types of librarians--be they masquerading under other prestigious titles or not--must be rooted solidly in librarianship. Neither the graduates nor society will be served by an injudicious yielding to transitory pressures for courses of study which may spawn a generation of misfits who can expatiate at length on the derivation of a mathematical model of a theory of information, but think a corporate entry is a key to the executive washroom. (p. 36)

The negative references to library science in the definitional literature were accompanied by contrastingly positive descriptions of information science. Among them are the following expressions: "more sophisticated problem solving", "modern developments", "newer developments", "the newer systems approaches", "a newer type", "new practices", "new skills", "the new technology", "the scientific and technological revolution", "the dynamic library", "the new", "the new world", "the new info realities", "radically new methods", "a new discipline", "an emerging discipline", "the new profession", "the vigorous young discipline", "innovative change agents", "non-traditional courses", "non-conventional devices", "promising information

scientists", "on a high level", "in high gear", "the active", "scientific attitude", "fresh insight", "a strong specialization", "fresh approaches", "keener insight", "assertive", "dynamic", "pro-active".

This clustering of value-laden terms shows the diversity and frequency of virtue words which have appeared in the definitional literature of library science and information science. The use of such terms involves not just a cognitive appeal, but also expresses feelings about the terms. However, to function as a definition, terms must be used which describe, not evoke or evince, conditions and states of affairs. Emotively-toned language is ruled out of definitional expression, because it permits feelings and reactions about a notion to be confused with the notion itself.

In this vein, Baxendale (1966) observed that the language of documentation was filled with needless ambiguities, artificial distinctions, and that:

> [The] illusory boundaries being drawn between documentalists and librarians are based not so much on differences in purpose and activity as on mutually unrecognized synonymies in language and in practices. This state of affairs has inhibited communication. It will be regrettable if artificial distinctions are frozen into the curricula currently being formulated by the universities. (p. 73)

Ashworth (1977), more than a decade later, put it this way:

> The question was whether [there existed] . . . a difference of degree or of kind, and the matter was clouded by vested interests and the inability of either side to argue logically once the opposing views had been polarised.
>
> . . . .
>
> [Although] we professionals no longer seriously misunderstand the relationship between information work and librarianship, everyone else has absorbed the message that they are totally different and that while information work has all the glamour, librarianship has none. (p. 7)

Another conceptual difficulty in the definitional literature of library science and information science resulted from "nominal characterizing". Schur (1973), for example, stated:

> In our view, large areas of modern librarianship and areas in data processing are included in the field of the information specialist. (pp. 7-8)

Garrison (1977) alleged:

> Anyone can make up his own list of information specialties which are looking for a respectable academic home and belong in our [library] schools. Here are a few: 1) records management; 2) art and museum librarianship; 3) archives, manuscripts and oral history; 4) science information; 5) technical information center management; 6) information systems design; 7) urban information (both to the people and to the professionals); 8) learning resource centers (broader than school libraries); 9) national and international information networks and policies; 10) ethnic, language, and area studies; 11) biomedical communications. (p. 181)

Kirwin (1977) contended:

> Indeed, the term information science is so broad as to encompass most of the traditional social sciences and liberal arts, in addition to computer science, library science, and cybernetics. (p. 24)

Earlier, at a conference held at the University of Chicago Graduate Library School to discuss the intellectual foundations of library education, Swanson (1964) declared:

> The fields of information science, information technology, information retrieval, and documentation will not be treated as separate topics but rather as an integral part of library science, . . . Thus we shall not be concerned with whether information science is part of library science or vice versa, . . . (pp. 1-2)

Asheim (1968), closely cited by the American Library Association (1970) and (1972), believed:

> A basic assumption . . . is this: that the library occupation is much broader than that segment of it which is the library profession, . . . (p. 1096)
> . . . .

> Throughout this statement, whenever the term "librarianship" is used, it is meant to be read in its broadest sense as encompassing the relevant concepts of information science and documentation; wherever the term "libraries is used, the current models of media centers, learning centers, educational resources centers, information, documentation, and referral centers are also assumed. (footnote, p. 1096)

Such nominal definitions contribute to conceptual obscurity, for there is virtually never any elaboration of the author's notion of the specified components; they remain nominal subsets only, names without concepts. In order to avoid ambiguity and divergent interpretation, each term within a definition must be defined unless it is indicated that the term is a primitive one. The nominal definitions which are hedged, that is, those which take in only the "relevant concepts", "large areas", or "most" of the nominal subsets, add further conceptual difficulty to analyzing their meanings because the borrowed elements and properties are unknowns. These nominal definitions have also been expressed in diagrammatic form by Chernyi (1974), in an analysis of how six major thesauri for informatics had defined the scope of information as a scientific discipline. His graphical representations for three of these are reproduced below (see Figures 4, 5, and 6 on page 214).

However commendable might be regarded this visual representation, the properties subsumed under each term remain unspecified and so unknown.

A further difficulty with the definitional literature has been the sporadic use of typographic surrogates in the form of single or double quotation marks, underlining or italicizing, abbreviations, and acronyms. Illustrations are: domain "a", domain A, domain "A",

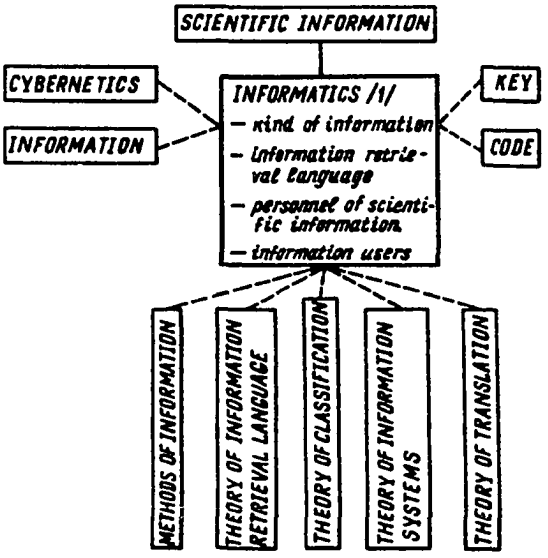


Fig. 4. Logical relations of the concept INFORMATICS (1) with other concepts in the "Tezaurus informacji naukowej" by M. Leska i K. Leski. (Warszawa, Institut informacji naukowej, techniczej i ekonomicznej, 1972, 337 pp.)

Fig. 5. Logical relations of the concept INFORMATION SCIENCE with other concepts in "A compressed term index language for library and information science" by A. Gilbriat and K. Gaster (London, Aslib, 1973, 123 pp.)

(p. 298)

. . . .

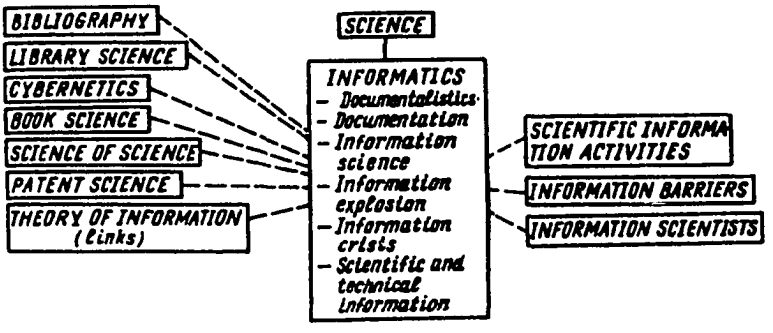


Fig. 6. Logical relations of the concept INFORMATICS with other concepts in the "Thesaurus for informatics" (Moscow, VINITI, 1973, 209 pp.)

(p. 299)

domain a, domain "a", and even domain "A". These visual substitutions for descriptive definition do not enlarge or render more precise one's understanding of the term being so used. Initialisms, similarly, do not add to meaning; an example is in the following passage:

> Librarians, traditionally service-oriented rather than research-oriented, have not exploited that body of knowlege [relating to a science of information] for general principles of IS. (Donohue, 1966, p. 120)

There are three further difficulties with adequate analysis of the definitions of library science and information science as set forth in the literature. These are unconscious defining, accidental defining, and implicit defining.

Unconscious or unintentional defining is typified by this passage from Verhoef (1960):

> I shall not try to find a solution here to the problem of defining documentation, for to do so would probably merely add a new definition to those already in existence and in all likelihood it would be just as debatable as all the others which have been formulated to meet the objections, if they really exist, to the FID [International Federation for Documentation] definition. In my opinion it is much more useful to analyse the practice of documentation and wherever possible to stress the differences and the similarities between documentation and librarianship. (p. 193)

Similarly, Chapin and Shilling (1962) noted:

> We have no wish to become involved in semantics [with respect to the terms documentation, librarianship, information retrieval, and others]. During the battle of definitions a war might be lost.
>
> There are differences which are easily recognizable between some of the above contrasting terms. (p. 410)

Melkonian and Donohue (1964) wrote in like fashion:

> In order to avoid for the present time questions of definition, I.S. [information science] programs were identified as "combining...library science with studies in other fields which offer radically different approaches to the information process. The disciplines now converging into the field of 'information sciences' are extremely diverse and they contribute a wide variety of tools and techniques: logical, mathematical, linguistic and electronic-mechanical." (p. 57)

Taylor (1964) wrote:

> Without attempting a definition, it may provide educational insight if we can state briefly and broadly what the documentalist's concerns are. (p. 33)

Similarly, Slamecka and Taube (1964) asserted:

> It is not our intention to add our ounce to the issue of whether librarianship includes documentation, or whether documentalists are information specialists who are special librarians who are librarians (or vice versa), or whether information technology is amateur, black-box librarianship; perhaps we may oblige all and regard ourselves as members of one large family. The crucial issue, from the viewpoint of the librarian family member, is that certain services, which historically seem to fall into the domain of the custodial and interpretive functions of his profession (either directly or by a logical extension of these functions), are performed outside the profession and, admittedly, with some degree of success and a considerable degree of public acceptance. (pp. 65-66)

Leslie (1966) alleged:

> [It] should be noted that debating the question of whether documentation is a special branch of librarianship or librarianship is a special branch of documentation amounts to little more than an exercise in provincialism. (p. 238)

Reynolds (1974) also observed:

> Without attempting a taxonomy of special libraries, I would like to force special librarianship between librarianship and information science. (p. 584)

Bottle (1977) noted:

> I do not wish to restart the arguments about the precise differences between librarians and information scientists on which so much energy was wasted in the 1960s with so little generation of light. (p. 37)

Although these authors state that no definitional claims are being set forth, in fact their ensuing descriptions contradict the disclaimers; for "describing", "providing insight", "stating concerns", "taxonomizing", "rejecting debate on an issue", "obliging all", and "regarding ourselves" are all ways of arriving at an

understanding of how a term or terms are being used. Such descriptive discourse serves the function of definition, whether the authors are conscious of what they are doing or not.

Accidental theorizing is said to have occurred when accidental features are taken as essential in marking off the notion defined. Brace (1975) defined in this way when he wrote:

> [Information science dissertations] were identified as such or . . . utilized mathematical and quantitative techniques more common to information scientists than to librarians. (p. 20)

Bottle (1977) held that:

> [Librarianship] and information science curricula can be regarded as two sets of overlapping spectra. The extent of overlap will depend on which sets of electives are taken for comparison; . . . (p. 37)

In adequate defining, however, only essential properties and conditions are specified; accidental features are ruled out. Electives and more common techniques do not function as pointers to essentials, but as pointers away from them.

A final conceptual difficulty in analyzing the extant conjunctional definitions of library science and information science is implicit theorizing; matters are not stated explicitly but must be inferred from the author's context. Swanson (1964) wrote:

> Whether librarians should be essentially literate scholars with a pervasive knowledge of books, or "numerate" information technologists with good understanding of computing machines can be expected to typify the issues that arise. (p. 5)

Lancaster (1973) predicted:

> The information science curriculum may differ considerably from the library science curriculum of today. "What goes on in a library" will no longer be the principal focus of study. (p. 18)

Havard-Williams and Franz (1974) wrote:

> No longer can the librarian or the information officer be a self-effacing modest creature hidden by the books. (p. 4)

Fosdick (1978) noted:

> "Non-traditional" offerings in the library science curriculum were considered as information science courses--in other words, courses that would not have been offered in library schools prior to the interest in and awareness of information science as a field in its own right in the 1960s. Implicit in this definition is that such courses relate to the relatively new practice of the manipulation of data by computer. (p. 101)

Galvin (1980) stated:

> Schools of librarianship do have the potential to broaden the scope of the education that they offer and to play a major role in the preparation of professionals to staff information organizations other than libraries. (p. 17)
> . . . .
> Library school curricula will need to center more on the principles of information transfer, and less on the characteristics of the library as the specific setting in which information transfer occurs. (p. 18)

Such implicit defining is not adequate for conveying the meaning of a term, for divergent implications can be drawn; no criterion is provided by which to mark off central inferences from extraneous ones.

2. The Name of the Domain

Almost all of the domain neologisms for library science and for information science reappear in the conjunctional definitions, so that there are relatively few new ones. However, there is a wide and inconsistent usage of conjunctional neologisms. They can be clustered into five sets of definitional views with respect to the proper domain of discourse. These sets consist of: 1) definitions specifying a difference between library science and information science;

2) definitions specifying a subordinate relation of information science to library science; 3) definitions specifying a subordinate relation of library science to information science; 4) definitions specifying a unity of library science and information science; and, 5) definitions specifying a subordinate relation of library science and information science to a superordinate domain. The domain neologisms used in each set are indicated below.

2.1. Different Domains of Library Science and Information Science

In this set, virtually every conceivable dichotomy of names has appeared in the definitional literature. Among the disjunctions are the following:

° Librarianship	-	Documentation
° Librarianship	-	Documentation and Information Retrieval
° Librarianship	-	Documentation and Information Work
° Librarianship	-	Educational Documentation
° Library Service	-	Documentation
° Library Work	-	Documentation
° Research Librarianship	-	Documentation
° Library	-	Information Science and Documentation
° Librarianship	-	Information Storage and Retrieval
° Librarian	-	Information Science
° Library	-	Information Science
° Library Science	-	Information Science
° Librarianship	-	Information Science
° Librarianship	-	Information Sciences
° Librarianship	-	Information Science and Engineering
° Librarianship	-	Information Technology; Theory of Information Systems
° Library Community	-	Information Science
° Librarianship	-	Information Work
° Library Work	-	Information Work
° Librarianship	-	Science Information
° Librarianship	-	Science Information Work
° Library Science	-	Science Information Work
° Library Science	-	Information Work
° Librarianship	-	Information Specialist
° Librarian	-	Information Officer

- Librarianship - Informatics
- Library Science - Informatics
- Library Science - Social Cybernetics
- Library Science - Information Theory of Management
- Librarianship - Communication Sciences
- Librarianship - Information Professions
- Library Profession - Information Profession
- Librarianship - Information Industry
- Librarianship or Library Science - Information Science (includes Computer Science, Programming Logic, Semantic Linguistics, Data Processing, Mathematics, Information Theory, Systems Analysis, Machine Translation, Statistics, Report Writing, Non-Traditional Subject Indexing)
- Library and Information Science - Library and Information Science

2.2. Information Science as a Subset of Library Science

A similar divergence of names for the related domains is registered. Among the combinations are the following:

- Documentation - Librarianship
- Documentation - Libraries
- Documentation - Library Activities
- Documentation - Library Service
- Documentation - Special Librarian
- Documentation - Science Information Specialist
- Documentation - Bibliographic Control
- Documentation - Bibliographic Organization
- Documentation - Bibliographic Management
- Documentalist, Special Librarian, and Information Officer - Librarianship
- Information Science, Information Technology, Information Retrieval, and Documentation - Library Science
- Information Science, Systems Analysis, and Documentation - Librarianship
- Information Science and Documentation - Librarianship
- Information Science and Documentation - Library Service
- Documentation, Information Science, Informatics, and Informatology - Librarianship
- Documentation, Information Science, Informatics, and Informatology - Information Work
- Documentation, Information Science, Informatics, and Informatology - Information Specialist

° Information Science - Librarianship
° Information Sciences - Librarianship
° Information Science - Library Field
° Information Science, Operations Research, Systems Analysis, and Mechanization - Librarianship
° Information Science and Media Librarianship - Librarianship

2.3. Library Science as a Subset of Information Science

In this class there is a greater tendency to treat information science as a greatly enlarged domain. The following combinations typify the definitional literature of library science taken in a subordinate relation to information science:

° Library Science, Computer Science, Linguistics, Electrical Engineering, and Cybernetics - Information Sciences
° Library Science, Computer Science, Cybernetics, Social Sciences (some), and Liberal Arts (some) - Information Science
° Library Science, Records Management, Art and Museum Librarianship, Archives, Manuscripts and Oral History, Science Information, Technical Information Center Management, Information Systems Design, Urban Information, Learning Resources Centers, National and International Information Networks, Ethnic, Language, and Area Studies, and Biomedical Communications - Information Specialties
° Librarianship, Documentation, Computers, Communications, and Graphic Arts - Information Science
° Library Science, Archivistics, Documentation and Information, and Communication and System Theory (some) - Information Sciences
° Library Scientists, Computer Scientists, and Communication Scientists - Information Scientists

° Publishing, Bookstores, Libraries, and Retrieval Services	-	Documentation
° Library	-	Information Science and Technology
° Librarians	-	Information Science and Technology
° Librarianship	-	Information Science and Technology
° Librarians	-	Information Storage and Retrieval
° Libraries	-	Information Storage and Retrieval
° Librarianship and Documentation	-	Information Science
° Librarianship	-	Documentation
° Librarianship	-	Information Engineering and Information Science
° Library Science	-	Information Engineering and Information Science
° Librarianship	-	Information Technology
° Librarianship (large areas) and Data Processing (some)	-	Information Specialist
° Library Science	-	Information Engineering
° Librarianship	-	Information Science
° Library Science	-	Information Science
° Librarians	-	Information Work
° Librarians	-	Information Workers
° Library Activity	-	Information Practice
° Library Activity	-	Information Science
° Library/Information Profession	-	Library/Information Professsion
° Librarianship	-	Information and Communications Communities
° Library Science	-	Information and Communications Communities
° Librarianship	-	Information Professions
° Library Science	-	Information Professions
° Library Science, Archival Science, Information and Documentation Science, Journalistic Science, and others	-	Information Science

2.4. A Unified Domain of Library Science and Information Science

This clustering comprises various combinations of domain neologisms already specified in various separate contexts in the

definitional literature. Among them are:

- Documentation and Librarianship
- Librarianship and Documentation
- Library and Documentation Community
- Information/Documentation/Librarianship
- Documentation, Library and Archives
- Documentary Information Work
- Scientific Documentation Work
- Documentation and Information Sciences
- Librarianship and Information Work
- Library/Information Work
- Information Library Archive Work
- Library Information Work
- Library Information Field
- Librarian and Information Officer Profession
- Scientific Information Work
- Science Information
- Scientific and Technological Library and Information Work
- Information and Library Personnel
- Librarians and Information Workers
- Librarianship and Information Service
- Library Studies and Information Science
- Library and Information Services
- Library and Information Studies
- Librarianship and Information Science
- Library/Information Science Profession
- Library and Information Profession
- Library and Information Professions
- Library/Information Profession
- Library and Information Science
- Library-and-Information-Science
- Library and Information Sciences
- Information and Library Science
- Library (and Information) Science
- Librarian and Information Manager
- Librarian-Manager
- Information Sciences and Technologies
- Information Science Arts, Crafts, or Technologies
- Librarianship
- Library Science
- Library Work
- Information Work
- Information Business
- Information Science
- Information Profession
- Information Professional
- Information Professionals
- Informatics

2.5. A Superordinate Domain subsuming Library Science and Information Science

In this class are the conjunctional definitions of library science and information science that posit a larger domain encompassing both of them and frequently encompassing many other domains as well. Three broad clusters can be identified in the definitional literature. These are: information management, social epistemology, and notification.

2.5.1. Information Management

The term 'information management' is the most common in this cluster, although other similar terms are used as well, including 'information science' and 'information profession'. The difficulty with the usage of this and related terms in the literature is widely divergent specification of what is taken to be 'information management'. Illustrations of this point follow.

- ° Information Management - Librarians, Archivists, Records Managers, Audiovisual Specialists, and Information Scientists
- ° Information Management - Word Processing Programs, Computers, Data Banks and Information Systems, Records, Programs and Depositories, Reports Control and Inventories, Statistical Programs and Data, Paperwork Management, Libraries and Information Centers, Printing and Reprographic Programs, and Microform Programs
- ° Information Resources Management - ditto
- ° Information Management - Training, Marketing, Intelligence, Systems Design, Information Brokerage, Information Units, Libraries and Report Centers
- ° Information Professional - ditto

° Information Transfer	-	Librarians, Information Scientists, and Information Managers
° Information Field	-	Librarian, Special Librarian, Documentalist, Literature Analyst, and Information Scientist
° Information Professionals	-	Author/Writer, Editors, Publisher, Abstractor/Indexer/Cataloger, Information Counselor, Operations Analyst, Research Assistant, Subject Specialist, On-Line Searcher, Reference Librarian, Referral Specialist, Technical Information Specialist, Systems Analyst, Operations Researcher, Computer Systems Analyst, Information Scientist, Systems Designer, Librarian/Archivist, Audiovisual Specialist, Data Base Manager, Library Director, Computer Scientist, Library Scientist
° Information Professionals	-	Information Management, Data/Information Preparation for others, Data/Information Analysis for others, Searching on behalf of others, Information Systems Analysis, Information Systems Design, Communications Researcher, Computer Scientist, Information Scientist, Library Scientist
° Information Disciplines	-	Computers and associated Automation Technologies, theory and practice of statistics and probability, Communication and Telecommunication, Publishing, Printing and Replication, Libraries and Library Science, Microform and Miniaturization Technologies, Information Sciences, Systems and Management Sciences, and the Information Arts
° Information Professions	-	ditto
° Information Work	-	Library and Information Professions
° Information Work	-	Librarianship and Information Science
° Communications Profession	-	Media, Library, and Information Science
° Communication Science	-	Information Science and Library Science

2.5.2. Social Epistemology

This was the neologism promoted by Margaret Egan and Jesse Shera in the 1950s to describe a study of intellectual forces shaping social structures. It was also referred to as 'social cognition'. The science of librarianship and the discipline of information science were subsumed under social epistemology.

2.5.3. Notification

Robert Fairthorne developed the notion of 'notification' to designate documentary or informational communication activity where delegation constituted the essential element. The term 'notification' almost always appeared in the literature in the context of references to information science, documentation, information retrieval, the information sciences and technologies, the information sciences, library science, libraries, and/or librarians. More recently, Karlen (1980) extended the notion of notification in the framework of 'information transfer'.

2.6. Comments

Vagianos (1971), following a review of the literature relating to forms of education for scientific and technical information work, made the following observations:

> We have heard much talk (and contributed some ourselves) of "information managers", "information scientists", "subject specialists", "information specialists", "information technologist", "technical information specialist", "librarian technician", but no one has thus far defined each "animal" in

> sufficient detail to serve as a prototype. (p. 2)
> . . . .
> Determining at the outset who and what we are talking about is impossible. The field is so shrouded in semantic fog that it is hard to tell the players without a program. Any one who reviews the incredible display of titles culled from the literature . . . will recognize that any attempt to introduce common terms, thus order, would be futile. The nature of the human animal ensures the rapid proliferation of synonyms--particularly a large assortment based on sheer preference in nomenclature. (p. 19)

3. The Nature of the Domain

Not only is the definitional literature relating library science and information science characterized by a plethora of names for the domain or domains indicated, but the description of their natures is equally inadequate. Terms are used in contradictory and inconsistent senses, and rarely defined by the user theoretician.

Moreover, the definitional literature reveals a wide range of views about the status of the domain or domains under discussion. No consensus emerges with respect to philosophical status or to sociological status. Questions about philosophical status have taken the form of whether the domain is a science, a scholarly discipline, a field of knowledge, a technology, a practice, or the like. Questions about its sociological status have taken the form of whether the domain is a profession, an occupation, a service, a social activity, or the like. The following analysis shows the relationship of domain nature to domain neologisms as set out in the conjunctional definitions.

3.1. Different Domains of Library Science and Information Science

In this set of definitions is found a great frequency of conceptual mixtures of philosophical and sociological characterizations. Thus the following apparent dichotomies appear as definitional elements in the conjunctional literature of library science and information science:

°	humanistic tradition	- a science and a technology
°	humanistic tradition	- a field of scholarly investigation
°	service-oriented	- research-oriented
°	service-oriented	- intellectual and theoretical base
°	service-oriented	- study and design of systems
°	a profession	- an emerging metascience
°	a profession	- an emerging discipline
°	a profession	- a science
°	a profession	- research and development
°	a profession	- a multidisciplinary profession
°	a profession	- a field of intellectual endeavor
°	professional knowledge	- scientific foundations
°	institutional	- a new scientific discipline
°	library community	- a nascent science
°	a field	- an interdisciplinary science
°	research librarianship	- a scientific attitude
°	a practice	- scientific and experimental research
°	a codified body of practice	- intellectual foundations
°	a codified body of practice	- a field of inquiry
°	literate scholars	- numerate information technologists
°	a utility	- a construct for generalization

3.2. Information Science as a Subset of Library Science

Descriptions of the nature of the domain in this class of conjunctional definitions are as follows:

°	a science	- a philosophical study
°	a scientific area	- a prescientific discipline
°	an area of research	- the generic term
°	interdisciplinary areas of research and study	- the generic discipline

°	research	- an occupation
°	intellectual and theoretical base	- the generic discipline
°	an emerging discipline	- a profession
°	new specialties	- a field
°	one art of	- the art
°	interdisciplinary concepts	- a service

3.3. Library Science as a Subset of Information Science

This class includes the following distinctions in the definitional literature with respect to the nature of the domain:

°	the applied component	- a basic and research oriented discipline
°	an application	- a technology
°	an applied aspect	- an interdisciplinary science
°	an activity	- a science
°	a practice	- a science
°	an institutional profession	- a discipline or series of tools
°	institutional techniques	- a diversifying profession
°	services	- engineering and science
°	a societal agency	- a scholarly discipline
°	a service agency	- a basic science
°	a professional group	- a science and a technology
°	a professional discipline	- theoretical foundations
°	a professional discipline	- a theoretical discipline
°	a professional field	- a branch of knowledge
°	a practice	- a body of theory and facts

3.4. A Unified Domain of Library Science and Information Science

The definitional literature which has argued the existence of one unified domain of library science and information science has not revealed, nevertheless, a unified conception of its nature. The following characterizations are noted:

° a field
° a field of study, technology, and services
° an interdisciplinary field

- a professional field of activities
- a developing cross-disciplinary field of problems
- a discipline
- an interdiscipline
- a science
- a technology
- an art
- a corpus of professional knowledge
- a profession
- professionals
- a social activity
- a process comprising different stages
- a service
- a service industry
- a service activity

3.5. A Superordinate Domain subsuming Library Science and Information Science

In this class are descriptions of the nature of the domain taken as a conception subsuming library science and information science.

3.5.1. Information Management

- a field
- a body of analysis techniques
- a profession
- an emerging profession
- professionals

3.5.2. Social Epistemology

- a study
- a new science
- a new discipline
- a field of inquiry
- an interdisciplinary field

3.5.3. Notification

- a field
- a theory
- a service activity
- a task
- a model

3.6. Comments

These terms reveal a wide range of views about the nature of the domain or domains under discussion in the present inquiry. No consensus in the scholarly community emerges from the definitional literature with respect to philosophical or sociological status. Moreover, philosophical and sociological conceptions of the domain are frequently conflated; for example, the scientific nature of one domain is claimed to contrast with the professional nature of another. These difficulties are analyzed in more detail in section 8 following.

4. The Focus of the Domain

While there may well be a delicate tension within a scholarly community at any given time between conceptual consensus and conceptual diversity, nomenclature variations and discrepancies produce dissension and disputation. Conceptual evolution is impeded by elaborate argumentation over fuzzy names, when other elements of a rational enterprise are also inadequate or altogether absent, elements such as a strong citing tradition, the striving for universality and international generalizability, and devotion to logical and conceptual analysis for concept, problem, and hypothesis formation. That is the condition of the present situation in library science and information science.

Three principal categories of domain focus were identified in the previous chapters which have examined the separate definitional literatures of library science and of information science. These

three categories of definitional focus were as follows: an emphasis on objects, an emphasis on human beings, and an emphasis on both objects and human beings. A fourth category is required here. It is required in order to encompass conjunctional definitions which focus on the philosophical and/or sociological properties of the domain or domains under discussion. Such definitions are at a "metalevel" of the domain or domains. They are not specifications of functions within the domain, but rather, characterizations of the domain with respect to all other domains, possible and actual.

Within the enlarged taxonomy of foci, then, the conjunctional definitions are further sorted according to the primary function, activity, role, or the like, which the theorizer identified. Following previous chapters, each distinguishable functioning is treated as a set encompassing all synonymies. Where a definition specifies both a functioning within the domain and its kind of domain at the metalevel, the parts are separately assigned to its relevant set of synonymies, so long as the context could be preserved.

As mentioned above, glossary compilations have been excluded from this analysis because the presence of definitions for both library science and information science was not noted or addressed; such juxtapositions as there might have been were apparently accidental rather than deliberate.

The factor of domain names has been excluded from the analysis and categorization of conjunctional definitions, because the employment of names has been at times incoherent, at times incongruous, and at times contradictory. While it is possible that a statistical correlation exists between terminological variation and conceptual

consensus, such an indicator would be merely the quantification of opinions. Nothing would be thus revealed about the logical adequacy of the designated names. These are neologisms "of no fixed address", names without concepts. They constitute a moving target for critics.

The table below summarizes the taxonomy of conjunctional definitions; the generic name of each set is indicated. Synonymies are presented in subsequent sections.

TABLE 9

SUMMARY OF CONJUNCTIONAL DEFINITIONS

Definitional Focus	Generic Terms
5. Objects	5.1. To make accessible
	5.2. To retrieve
	5.3. To transfer
	5.4. To process
	5.5. To create and use
	5.6. To use
	5.7. To analyze
	5.8. To evaluate
	5.9. To manage
6. People	6.1. To teach
	6.2. To enlighten or inform
	6.3. To study human cognition
7. Objects and People	7.1. To make accessible
	7.2. To retrieve
	7.3. To transfer
	7.4. To process
	7.5. To counsel
	7.6. To link
	7.7. To create and transfer
	7.8. To create and use
	7.9. To use
	7.10. To analyze
	7.11. To evaluate
	7.12. To manage or control
	7.13. To mechanize
8. Kind of Domain	

5. Conjunctional Definitions about Objects

Those sets of conjunctional definitions focusing on functions with respect to objects are set forth in this section. They are: 1) To make accessible; 2) To retrieve; 3) To transfer; 4) To process; 5) To create and use; 6) To use; 7) To analyze; 8) To evaluate; and, 9) To manage. The table below sets forth the generic and synonymous terms for each set of conjunctional definitions.

TABLE 10

CONJUNCTIONAL DEFINITIONS ABOUT OBJECTS

	Generic Terms	Synonymous Terms
5.1.	To make accessible	To make available provide access give access provide guides
5.2.	To retrieve	To search
5.3.	To transfer	To disseminate supply transmit facilitate communication
5.4.	To process	To manipulate transform handle deal with abbreviate and file
5.5.	To create and use	To produce and utilize
5.6.	To use	To exploit assist with use
5.7.	To analyze	
5.8.	To evaluate	
5.9.	To manage	To produce services design, install, operate help provide systems

5.1. Conjunctional Definitions about Objects: To make accessible

This set of definitions emphasizes access to or availability of objects as the principal function of the domain or domains indicated. The examples below illustrate the diversity of domain relationships issuing from this functioning.

Pearce, 1918:

> Considerable attention is now being paid to the question of documentation and to the assistance which it can render to industry in the process of reconstruction and of post-war development. (p. 162)
>
> . . . .
>
> Degrees in library science will reflect the heightened status of the libraries of the future as the means whereby past knowledge can be made immediately available. (p. 163)
>
> . . . .
>
> [The] task of collecting, abstracting, indexing and translating information and of distributing it, must be placed in the hands of those who have been adequately trained in library science. (p. 165)

Shera and Egan, 1950a:

> The term "documentation" is not used in the United States as it is in Europe, though similar activities are carried on in a number of agencies by individuals with training equivalent to that given to documentalists in Europe.
>
> . . . .
>
> A broad definition of "documentation" would include all those processes involved in the assembling of collections of written records and in providing guides to their use. These collections include archives--federal, state, and local; and libraries--national, university, public, and "special." Guides to the use of these collections might include (1) the catalogs or calendars of individual collections, (2) subject bibliographies, (3) union catalogs and bibliographic centers, and (4) abstracting and indexing services. The personnel who provide and use these guides are archivists, librarians, and specialists trained in specific subject fields. (p. 8)
>
> . . . .
>
> There is in this country [the United States] no provision for the specific training of documentalists. Those who are now active in the various fields related to documentation have received their training in one of three ways: (1) training for librarianship; (2) training for archivists; (3) advanced training in a subject field. (p. 10)

. . . .
Many of the activities coming under the term "documentation" in Europe are carried on in this country by the staffs of the indexing and abstracting services and by special librarians. (p. 12)

Taylor, 1964:

Without attempting a definition, it may provide educational insight if we can state briefly and broadly what the documentalist's concerns are. We are concerned with the control (in the non-pejorative sense) and availability of packages of knowledge in order to make effective use of them. I use the word "package" deliberately, to avoid the connotations of "book," "document," or "bit." At one end of this spectrum of packages is the traditional book, with all its implied sense of permanency and typographic reverence. This is the professional area of competence of the librarian. At the other end is the bit of information, with a permanence and/or relevance measured in microseconds. Somewhere between these two and moving toward the latter end is the area of the documentalist. We are concerned with performing two operations on these packages: (a) naming or labelling them; and (b) manipulating both the package and its label. These are not unrelated to Robert Fairthorne's "marking and parking." (p. 33)

Penna, 1970:

A number of recent developments have emphasized the need to focus more attention on the planning, at the national and international levels, of library and documentation services.
. . . .
Pressures resulting from these challenges are broadening and deepening the complex of studies concerned with the provision of access to information and ideas, whether or not literature-based. Librarianship, formerly almost entirely concerned with access to information in books and periodicals, is now embracing studies of information retrieval in its widest sense. Documentation, which emerged as a body of techniques designed to give access to specialized information contained in journals, reports and other documents and for their reproduction, is now at the centre of a spectrum of studies which includes both the more traditional forms of librarianship and highly technical studies of the elements and processes of communicating specialized information which are the domain of the information scientist. (p. 13)
. . . .
However, at the time of writing it is safe to assert that access to the vast bulk of specialized information and cultural concepts is through the printed word. . . . Here, therefore, we have felt justified in using the term 'library service' to embrace both documentation and that aspect of information science which is concerned with improving the means of access to information and concepts preserved in the printed record. (p. 14)

5.2. Conjunctional Definitions about Objects: To retrieve

Like the manifold usages of the term 'retrieval' which were documented in the previous chapter, the conjunctional usages here are equally varied and inconsistent. The following examples encompass a range of conceptions with respect to functioning about objects from 'information handling', 'cataloging', and 'data manipulation', to 'current awareness and retrospective searching services'.

Taube, 1961:

> Early in 1952 I had arranged . . . to teach a course in some of the new developments in information-handling. I was asked for a name for the course . . . and I suggested the standard term "cataloging" or, if you will, "advanced cataloging." I was advised not to use such a name because the students would not take such a course. I then suggested the more glamorous term "documentation." I may say that it got me students, but it has created a problem ever since of explaining what documentation is, and it is this explanation which still involves us at this time.
>
> One thing which seems completely obvious is that cataloging in the sense in which it is practiced in all libraries is a form of information retrieval. . . . There have been writers in this field who have made sharp distinctions between retrieving "information" and retrieving a physical item which contains the information. I think it is a simple matter to show that the differences here are differences in degree. The information which is retrieved is always physical. It is a message of some kind. (p. 91)

Becker, 1968:

> Responsibility for storage and retrieval of printed information has traditionally rested with the librarian. (p. 301)
>
> . . . .
>
> Because of the great mass of data involved, new storage and handling techniques must be more advanced than those customarily used for manually shelving books and filing documents. The emergence of information storage and retrieval as a new field reflects an awareness among librarians and others that the selection and manipulation of fragments of information, rather than of entire documents, will require unconventional tools. (pp. 301-302)
>
> . . . .
>
> Another factor responsible for the independent development of the field of information storage and retrieval has been the impact of technology.

. . . .

> The field of information storage and retrieval involves librarians, documentalists, mathematicians, system designers, linguists, equipment manufacturers, operations researchers, and computer programmers, among others. All are concerned with methods of expediting the prompt retrieval of information in such diverse areas as libraries, business and industry, military command and control, and scientific research. Because the field is interdisciplinary, considerable confusion regarding the boundaries of the effort has existed. (p. 302)

Beasley, 1980:

> Although much progress has been made, information science(s) is still on the periphery of formal library education in many graduate programs when it ought to be in the center for the study of all types of libraries and for administration. A significant proportion of the profession in all of the Americas will need more than a passing understanding of the subject by the end of this decade. And by the end of the next decade, nearly all members of the profession will have to be functional in the information sciences. If they are not, personnel concerned directly with the organization and retrieval of material will be forced to separate and leave classical librarianship to classical librarians, which will be a loss to everyone--particularly the public. The gap between information science and communication theory and "library theory" is already so great that a major effort will be needed by library educators to close it. (pp. 32-33)
>
> Librarianship in other countries needs to rise to this state of professional development at once as a major national priority, because scientific and technical information (including the social sciences) is rapidly becoming internationalized, and the primary need now is for selective rather than generic knowledge.
>
> . . . .
>
> The slowness to develop quality information science programs (curricula) stems from several factors: normal delay caused by competing groups at universities defining their area of expertise, high cost of implementing, pluralistic character of both hardware and software, lack of trained faculty in library schools, the profession's primary concern in the 1960s with the expansion of general public services, and the inclination of industry to be secretive about data.
>
> . . . .
>
> Overall, more emphasis on information science also means a greater emphasis on "special libraries." (p. 33)

5.3. Conjunctional Definitions about Objects: To transfer

This set of definitions encompasses synonymous terms such as 'to disseminate', 'to transmit', and 'to communicate' with respect to given domain objects.

Haan, 1951:

> Documentation has been defined so broadly as to include all the activities of libraries. In common usage, however, the word librarian suggests primarily one who forms a collection of books, whereas the word documentalist implies one who disseminates information. It has been said that bibliography is the history of science registered in titles, whereas documentation merely supplies facts needed for a given purpose. The bibliographer aims for completeness, the documentalist selects. Thus documentation may be called applied bibliography. (p. 222 in Library Literature 1949-1951)

Vagianos, 1971:

> The term information specialist was chosen for the study because it was felt to provide the broadest general scope for eliciting the subject matter needed to complete the report. As the literature was surveyed, a multiplicity of titles emerged. In the end, the term "information scientist", despite many differing definitions, offered the broadest conceptual scope within the information field. (p. 6)
>
> . . . .
>
> [It] is possible to develop and adopt a generalized, stipulative definition of the information worker. . . . (p. 19)
>
> . . . .
>
> This nomenclature [information worker] has been used to replace the term information specialist from this point on in the report as it seemed less ambiguous. (footnote, p. 19)
>
> . . . .
>
> Information workers are . . . concerned with the selection, storage, retrieval and transmission of documents, ideas, and any other means of expression of fact, opinion, or theory in the most convenient, efficient, and economic manner possible. The information worker is concerned with any or all of the following:
>
> 1) the physical handling of materials, including selection and organization
> 2) the theoretical investigations into the information process
> 3) the design of information systems, including investigation into storage and retrieval, and transmission
> 4) the management of information systems. (pp. 19-20)

Kemp, 1976:

> The study of the nature and properties of the knowledge on

his shelves or in his computer is obviously particularly relevant to the student of librarianship and information science, because it is, as it were, his stock in trade. Without this study, the librarian or information scientist is like a surgeon practised in operational techniques and equipment, who knows nothing of the structure of the bodies on which he operates. (p. 11)

Libraries and information centres do not exist only as collectors of knowledge contained in documents; much more important, they strive to facilitate its communication. For this reason, the librarian or information scientist must know something of communication in general, of the creation and use of knowledge, and about the relationship of documented knowledge to other sorts. (p. 12)

5.4. Conjunctional Definitions about Objects: To process

This set of definitions treats of actions on objects which function to change their form.

Leslie, 1966:

Some day we may all agree on documentation, information science, sariology, information storage and retrieval, information technology, nonnumerical information handling or some other designation as a generally accepted name for it [the field]. Likewise we may even find some definition which delineates the scope of it to the satisfaction of all concerned.

For the time being, though, we have no difficulty in deciding whether a given topic or a given project belongs in the field or not. By tacit agreement, anything which deals with the manipulation of stored messages is acceptable as legitimate. By corollary, anyone occupied in the amorphous mass of activity surrounding the manipulation of stored messages has a legitimate place in the field. In this connection it should be noted that debating the question of whether documentation is a special branch of librarianship or librarianship is a special branch of documentation amounts to little more than an exercise in provincialism. (p. 238)

Kimble, 1975:

The main distinction between a file and a library is that a library deals with information items that have been grouped into documents. The term usually refers to books, reports, magazines, newspapers, and other papers, though it must include also individual items of information.

The consequences of this seemingly minor distinction are widespread. With the decision to create documents, it becomes

> all-important to abbreviate their contents. There are several kinds of abbreviations and, taken together and combined with filing operations, they constitute the field of library science. (p. 50)

Arntz, 1981:

> [Documentation] . . . by which we mean all information work. . . .
> . . . .
> Today when we say 'bibliography' we mean an area of librarianship. We must not forget, however, that by bibliography Otlet meant documentation, a word that did not yet exist in 1895. The twentieth century has seen the birth and growth of hundreds of organisations, systems, services and projects devoted or related to documentation (regardless of whether this field is called documentation, or information science, or informatics).
> . . . .
> [Documentation] entails the acquisition, ordering, storage, transfer, transformation and all other kinds of processing of raw information until it becomes evaluated, well-selected, reliable material ready for use, which due to the imperfection of our language is called information again. (p. 4)
> . . . .
> [The] creation of IFLA [International Federation of Library Associations] in 1927 . . . meant a clear distinction between librarianship (including bibliography in its actual meaning) and documentation (including reprography. . .). (p. 5)

5.5. Conjunctional Definitions about Objects: To create and use

Only one instance was identified in the definitional literature of a focus on the entire communication process from the creation of objects to their use. In this instance, library science was marked off as a segment within the overall process that excluded object creation.

Harlow, 1956:

> The word, "documentation" . . . is very closely related to librarianship; it might indeed be regarded as the family of which librarianship is a member. Although, personally, I should rather be called a librarian than a "documentalist," if only for aesthetic reasons, "documentalists" should be regarded as <u>we</u>, not <u>they</u>, whether we are enthusiastic about it or not.

> According to the pure doctrine of the International Federation for Documentation, "documentation" means the creation, transmission, collection, classification, and use of "documents" ("documents" being recorded knowledge in any form); or as the special librarians would have it, the production, distribution and utilization of documents. As librarians, we regard ourselves as having special rights and competence in certain phases of this program, particularly in the collection, classification, and use of publications. But what we have been unable or reluctant to accept is the unity of the whole process of communication, from the beginning of knowledge . . . through publication, to its organization and use. This cycloramic view does more than extend the librarian's horizon a few degrees, it reveals librarianship in all of its three-dimensional wonder as a major part of a cycle of human development, . . . (p. 1083)
>
> . . . .
>
> Much of what is now pertinent is expressed in the concept of "documentation," and we must embrace it, preserving meanwhile whatever is useful and humane in librarianship. (p. 1085)

5.6. Conjunctional Definitions about Objects: To use

'Exploitation of objects' and 'assistance with their use'

were synonymous definitional usages encompassed in this set.

Briet, 1951:

> Bibliography is the scientific method of the survey and classification of written documents. With the specialization of knowledge and the multiplication of activities of all sorts has come the need for an effective search of documents and the organization of documentary work. Centers of documentation have been created to fulfill this need. A new profession, that of documentalist, has arisen. The techniques of documentation flourished first in the domain of scientific research and later in the fields of humane knowledge (literature, history, philosophy, law, economics, history of science). The scientific field is revolutionary and inventive and requires renewed documentation. The field of the humanities is conservative and reflective and proceeds from the accumulation of the past. The conditions and tools of mental labor are very different today from what they once were. . . . The documentalist has become a member of the research team. He is a specialist in the field of knowledge covered by the organ of which he is a part; he knows the techniques of handling documents: choice, conservation, selection, reproduction; he has respect for the physical and intellectual integrity of documents; and he is able to proceed to an interpretation and selection of the documents in his charge, either for their distribution or the making of a documentary synthesis. The methods of the documentalist are borrowed from the older professions of archivist, librarian and museum curator, but the basis of his work is not universality and conservation, but specialization, diffusion and exploitation. . . .

> Questions of documentation vary from country to country, as shown by the problem of terminology. Thus, such neologisms as documentalist, documentation center and documentography are opposed to the older terms of special librarian, library and bibliography. The general tendency, however, is toward unity. (p. 219 in Library Literature, 1952-1954)

Taylor, 1971:

> [I feel] that poverty of definition is one of the basic problems that librarianship or library science suffers from; . . .
> . . . .
> [Librarianship] or library science (and these terms are interchangeable for me, as far as their content goes) is concerned with the organization and exploitation of collections of documents. (p. 466)

American Library Association, 1972:

> Throughout this document, wherever the term "librarianship" is used, it is meant to be interpreted in its broadest sense as encompassing the relevant concepts of information science and documentation. Whenever the term "libraries" is used, the current models of media centers, educational resources centers, information, documentation, and referral centers are also assumed. "Library service" is understood to be concerned with recordable knowledge and information in their several forms--their identification, selection, acquisition, preservation, organization, dissemination, communication and interpretation, and with assistance in their use. (p. 2)

5.7. Conjunctional Definitions about Objects: To analyze

This set of definitions focuses on the analysis of objects as the principal difference between library science and information science.

Frank, 1953:

> The term "documentarian" (dokumentar) is preferable to "documentalist", since the work is more closely allied to that of the librarian than of the journalist. While documentation and library service overlap, the former works more closely with the practical problems of industry and technology. Its cataloging can be simpler than that of the library, but annotations are essential to indicate contents.

> The documentarian needs to have knowledge of: a special field, the literature of that field, the existing documentation services, methods of procedure, technical aids, and languages. (p. 219 in Library Literature, 1952-1954)

Taube, 1961:

> What I am suggesting here is that the basic variable connecting librarianship with newer developments in documentation and information retrieval is just the concept of information. This means that one of the essential differences between standard library practices and the newer developments of documentation and information storage and retrieval is just the difference in degree of analysis and the size of the items stored. (p. 91)
>
> . . . .
>
> In this paper I shall accept the use of the term "information" to designate certain statistical properties of physical messages. (p. 93)
>
> . . . .
>
> Libraries are storehouses of recorded information, that is, of physical messages in various forms.
>
> . . . .
>
> Both libraries and documentation centers, both cataloging and information storage and retrieval, are concerned with information as a property of physical records. They are distinguished from each other, as we have said, only in degree. What emerges from this general conclusion is the recognition that techniques and devices which have been the basis of traditional librarianship are largely founded on the particular nature and physical form of the packages of information with which libraries have traditionally been concerned. This physical form, as the very name "library" indicates, is the book.
>
> . . . .
>
> It is true that even traditional libraries have other materials besides books--journals, periodicals, etc.--but, whereas the library takes on the obligation of cataloging its books, in general it buys indexes or catalogs of its periodical and journal holdings by buying another book, namely, a printed index, which some other agency has prepared.
>
> . . . .
>
> I have remarked in other places . . . that what caused the modern development of documentation and the modern concern of librarians with this topic was that a form of literature became important which was neither a book to be handled by the librarians nor a journal article to be handled by a scientific society, namely, the technical report. (p. 94)
>
> . . . .
>
> The traditional techniques of cataloging books were not adequate. (p. 95)
>
> . . . .
>
> What I am saying is that librarianship, like supply-cataloging and data-processing, inventory control or traffic control, is a form of applied information theory, and the study of information as a physical property of messages is the basic professional part of librarianship. (pp. 95-96)

Majewski and Ostrowska, 1964:

> The discussion [of the Training Committee of the International Federation for Documentation] centered on the problem, a vital one for many years past, of drawing a line between the profession of a documentalist and that of a librarian. Stress was laid on the fact that a documentalist on a high level should primarily be an expert in his branch of learning, versed in the methods of documental work, as a person primarily interested in the context of documents in defined fields of science, whereas a librarian mainly needs the skill of finding the information and keeping it in conformity with the adopted system of classification. (p. 5)

5.8. Conjunctional Definitions about Objects: To evaluate

These definitions emphasized object evaluation as the principal focus of the domain functioning:

Farradane, 1972:

> [Information work is] the collection, collation, evaluation, and organized dissemination of scientific and technical information. If by "technical" there is to be understood any field having established techniques, then the definition will still be adequate. The definition does, however, make clear the essential difference between information science and librarianship, in that information science is primarily concerned with the organization of information, and not of the sources of information; information scientists use libraries (and any other sources of information), but do not organize them. (p. 674)

Ashworth, 1977:

> The information-officer versus librarian controversy has a long and tarnished history which those outside the profession find difficult to understand. It arose from within those industrial and other special libraries dealing with facts as well as documents, which were often developed by scientists or technologists who were on the spot when the need arose, rather than by librarians who were then mostly engaged in improving more general types of library. The differences between these specialised libraries and the older, more conventional libraries rested in the rapidity of the growth of the scientific and technical knowledge they had to handle, the specialised language of this knowledge, and the more difficult smaller formats through which the knowledge was communicated. There was a newly recognised need for dissemination, evaluation and presentation of information. Finally, there were problems of industrial secrecy which placed restraints on the systems devised.

> The question was whether these factors, taken together, created a difference of degree or of kind, and the matter was clouded by vested interests and the inability of either side to argue logically once the opposing views had been polarised.
> . . . .
> [Although] we professionals no longer seriously misunderstand the relationship between information work and librarianship, everyone else has absorbed the message that they are totally different and that while information work has glamour, librarianship has none. (p. 7)

5.9. Conjunctional Definitions about Objects: To manage

This set of definitions focused on object management, including object designs and object operations.

Bonn, 1958:

> The purpose of this paper is (1) to present a record of world-wide facilities presently available for the training of interested persons for activity in scientific documentation work, . . .
> . . . .
> The training is to prepare persons for work as special librarians (or documentalists or information officers or whatever else they may be called) concerned in any way with scientific or technological information, including the production of services to utilize such information and the performance of research and development to improve and enrich it. (p. 1441)

Taube, 1964:

> Similarly, information technology is a professional and not a scientific activity.
> . . . .
> Information technology, as a profession, is concerned with the design, installation, and operation of information systems. (p. 120)
> . . . .
> Unfortunately, information technology is not a science, and basic research in information technology is a scientific aberration. (p. 121)
> . . . .
> Librarianship is a particular application of information technology to collections of books and periodicals. It has certain similarities and it differs from other applications--the organization and searching of patents, the organization of materials for publication in indexes and abstract journals, the organization and control of inventories, the classification of cargo and the loading and unloading of ships, etc. (p. 123)

Vagianos, 1971:

> The specific work to be done can be put simply: to help provide the best information system possible. (p. 20)
>
> . . . .
>
> The literature surveyed points to the inescapable conclusion that librarianship remains the generic discipline for study in the fields that are associated with information work. Documentation, information science, informatics, informatology are areas of research and study which draw their substance, methods and techniques first from librarianship and then from a variety of disciplines. Their value is evident in the fact that they augment the accumulated traditional body of knowledge and expertise within librarianship by providing an expanded and more comprehensive intellectual and theoretical base which improves the information worker's operation on the practical level. The theoretical level for the new developments carved out by the interdisciplinary areas associated with documentation, information science, informatology, and informatics is usually concerned with the development of mathematical and logical generalizations concerning the gathering, storage, use and transmission of information; while the practical level is concerned with the development of machinery, particularly the equipment developed in the fields of computers, television, photography and micro-photography, to handle information records, the development of software to support the machinery and the development of systems which combine the two to produce a useful result. (p. 26)
>
> . . . .
>
> Information workers are concerned with the design, installation, and operation of information systems. (p. 49)
>
> . . . .
>
> [Librarianship] remains the generic discipline for study within the applied field of information work. (p. 50)

Comments

These sets of conjunctional definitions taken from the literature are inadequate because they exclude the human being from the domain or domains indicated. The social nature of the specified functionings is suppressed. The focus is thus on the manipulation of objects without reference to human recipients. This incompleteness characterizes all the sets of functions in this general grouping of conjunctional definitions.

There are several other inadequacies which merit attention.

First, almost all of the generic terms that specify principal functioning are used interchangeably as synonymous terms. 'Availability' or 'accessibility' is taken to be synonymous with the operations of 'labelling' or 'manipulating' objects. 'Retrieval' is taken variously to be object 'handling', 'filing', 'manipulation', 'analysis', 'access', 'dissemination', and 'transmission'. Similarly, 'processing' is taken variously to be object 'retrieval', 'transfer', 'storage', 'transmission', 'dissemination', 'analysis', 'organization', 'selection', and even 'reproduction'.

Another definitional inadequacy is the frequent conflation of setting and content of the domain or domains. Taylor (1964), in Section 5.1., for instance, hypothesizes a spectrum of "knowledge packages", at one end of which was the book, in the middle the document, and at the other end the information bit, each type of package marking off a different domain, respectively, librarianship, documentation, and an unnamed domain. Two observations about this conceptual model can be made. The spectrum concept is flawed because the book or document are not comparable to the information bit but rather to a computer tape or disc; the bit is to the computer what the print character is to the book and document. Moreover, domain differentiation based on the kind of object treated is an inadequate procedure. Taube (1961), in Section 5.7., makes the same kind of inadequate domain differentiation, in his taking of documentation as technical report handling and librarianship as book handling.

There is in addition the conceptual difficulty posed by the suppression of essential defining elements. Beasley (1980), in Section 5.2., for instance, implied but did not make explicit that the

information sciences were associated with "the organization and retrieval of material", with scientific and technical information, and with the "pluralistic character of both hardware and software" (pp. 32-33). Which of these elements, if any, were necessary properties for designating the domain of the information sciences was not specified and so is unknown. Similarly, Slamecka and Taube (1964) wrote that:

> In contrast to the newer programs now being proposed for the education of information science or technology specialists whose profession at present appears distinguished from that of librarianship by the absence from its objectives of certain kinds of service, the education for librarianship must present the subject of intellectual and physical manipulation of information. . . . (p. 72)

The "certain kinds of service" asserted to be absent from the objectives of librarianship were not, however, enumerated, and so such unknown elements are not susceptible to logical and conceptual analysis.

6. Conjunctional Definitions about People

The table below indicates the relatively few conjunctional definitions in the literature of library science and information science that have focused primarily on human behavior and human effects.

TABLE 11

CONJUNCTIONAL DEFINITIONS ABOUT PEOPLE

	Generic Terms	Synonymous Terms
6.1.	To teach	To educate conduct training learn
6.2.	To enlighten or inform	
6.3.	To study human cognition	To study effects study image changes

6.1. Conjunctional Definitions about People: To teach

Two instances of this class of conjunctional definitions were identified in the literature.

Meredith, 1961:

> What flows from the pen must be transmitted, stored and released at the right times and places to the brains which are in the right state to be energized by them. This process of verbal engineering we call Librarianship. (p. 191)
>
> . . . .
>
> Libraries are used for at least four distinct purposes--for research, for education, for general reading and as museums of literature. (p. 193)
>
> . . . .
>
> [The] concept of educational documentation . . . means both "documentation for educational requirements" and "education through documentation". A library is itself an educational experience. Children accumstomed to regular visits to the library from an early age can hardly fail to absorb a tacit acceptance of orderly arrays of literature as amenities of civilization and as bases for unlimited emotional and intellectual adventures. The quiet, efficient, helpful, undidactic library staff, whose very unobtrusiveness is such a contrast to the insistent discipline of school, presents a model of implicit instruction in civilized intellectual values.
>
> . . . .
>
> [Space flight] achievements require immense quantities of processed information. Documentation and defence are intimately linked and this sets the pace in modernizing librarianship. (p. 194)
>
> . . . .
>
> [The] librarian and the client are joint partners in an expanding enterprise which is continually springing novelties on both. They have much to learn from each other. Their mutual relationship must be thought of in terms of a two-way educational process. . . . Through this contact the work of the student, scholar or scientist will become more fruitfully related to the documentary sources of knowledge whilst at the same time the techniques of librarianship become more precisely adapted to the growing variety of demand on these resources. (p. 195)

. . . .
[The] educational problem in documentation . . . [is] handling documents, whether as a research-worker, a teacher or a librarian . . . [and] mastering and devising different [classification] codes. . . . If we wish to move freely in the realm of documents, we must learn to use codes. (p. 196)

Mikhailov, Chernyi, and Gilyarevski, 1969:

In the textbook on general library science used in Soviet higher educational establishments, the subject area of library science is defined as the "study of content, organization and methods of public utilization of books . . . Development of basic aspects of Soviet library science, especially such as the propaganda of books and guidance of reading, is possible only in close association with pedagogy, since library science, which studies aspects of book utilization for communist education of the people, is in essence a pedagogical discipline". (p. 21)

Brittain, 1977:

[It] has been suggested that education is a process of information retrieval and information handling. We should be teaching users how to solve problems (indeed, how to formulate problems) and retrieve information. By education we mean, in this context, the continuing education of users as well as the education of students. (p. 46)

Mikhailov and Gilyarevsky, 1978:

[After the 18th century] the libraries underwent differentiation. Scientists and practitioners no longer constituted the majority of library users, and the principal task of the libraries . . . has become that of ideological and cultural education. (p. 131)

Berger, 1981:

Since we will be providing access to information products and services, responding to and identifying information needs, we will be in an excellent position to educate all types of users. We can educate researchers in all the related disciplines about the research needs; we can educate the information providers to the users' needs from our perspectives; we can educate the users, and each other, to the availability of information, and we can educate the lawmakers to the impacts of their decisions on both users and providers of information. Most importantly, we can educate the users how to use the products and services themselves.

As a profession, we have a choice, we can throw our influence and energy into becoming gatekeepers and guardians of the ways of access, or we can help people answer their own questions by teaching them to use the blossoming technology. (p. 14)

Greer, 1981:

> Once the librarian seeks a goal or function other than identifying, collecting, organizing, storing and providing access to societal records, the focus must be on people. . . . This concern, plus the objective of serving cultural, educational, recreational and informational functions radically alter the librarian's role from passive to assertive, from a bystander waiting to collect yesterday's records to a dynamic participant influencing the course and direction of events. (p. 78)
> . . . .
> [The] librarian-manager must also be an educator in the fullest sense. He or she must not only educate the client population on the nature of the information systems design and the way it can feed information to them, but also, must be competent enough in the archival processes to be able to conduct in-service training for the staff and evaluate performance. (p. 83)

6.2. Conjunctional Definitions about People: To enlighten or inform

Four instances of this class of definitions were identified in the literature.

Parker, 1971:

> I am a strong supporter of libraries in their functional role of providing all people with easy access to information and education about whatever they want whenever they want. The library has long been a cornerstone in our democratic system of government, which requires an informed electorate to operate effectively. This historic role of being the receiver's agent in a communication system that has in the past been largely dominated by the senders of messages, is becoming increasingly important as the society itself becomes more complex and as individual citizens become more involved in the decision-making processes of the society. Therefore, I am a strong advocate of libraries developing and adopting whatever technologies can best help them to serve that function. The alternative would be for libraries to maintain only their traditional technologies and permit new institutions to grow up around the new technologies, possibly usurping the library's traditional function. The implication for educational institutions is clear: Train people who can develop and adapt new technology and new techniques to make it easier to provide the kind of information access capability our society requires. (pp. 52-53)

Shera, 1973:

> The library should be the "crowning glory" of our educational

system, . . . [and] the library should also be a place to which the good citizen can turn to make himself a better, more enlightened, citizen. (p. 106)

Williams and Pearce, 1978a:

> The library profession bears a unique relationship to the human communication system. No treatment of this system offered to librarians and information scientists would be complete without a discussion of their profession. Our theoretical model of the human communication system provides the foundation for a theory of librarianship and the library profession.
> . . . .
> The library performs the critical function of preservation, which is the keystone of civilization.
> . . . .
> The library and the library profession in the United States have a unique and essential political function. The democractic and libertarian principles that are fundamental to American social life require the existence of an information resource accessible to everyone without charge, controlled by no private interest, and constrained by no orthodoxy. The American religious commitment to freedom and to the autonomy of the individual demands that the political institution provide full and ready access to the intellectual resources that make freedom of choice and intellectual self-determination possible.
> . . . .
> The library profession has an ancient and honorable commitment to the transcendent importance of literature. In the past this commitment inspired the profession's attitude toward preservation. Today the profession's commitment to the importance of literature is manifested in its concern for distribution. The emphasis is on doing everything possible to make literature accessible and to promote its use. (pp. 96-7)

Boorstin, 1981:

> Libraries--or as you say 'Library Services'--are here equated with 'Information Services.' Which is perilously close to saying that Knowledge can or should be equated with Information.
> . . . .
> The Information Industries are a whole new world of business celebrity.
> . . . .
> Meanwhile, what has become of our Knowledge-Institutions? These do not deal mainly in the storage and retrieval of information, nor in the instant flow of today's facts and figures which will be displaced by tomorrow's reports or bulletins. Rather they deal in the enduring treasure of our whole human past. They include our colleges and our universities--and of course our libraries. (p. 111)
> . . . .

> What does all this mean for the world of knowledge which, of course, is the world of libraries? It should be plainer than ever that our libraries are needed to keep civilization in perspective.
> . . . .
> We must never forget that our libraries are our Fortresses of Knowledge. (p. 112)
> . . . .
> In our time our libraries have two paradoxical, sometimes conflicting roles. Of course we must be repositories of information. But we must also somehow remain places of refuge from the tidal waves of information--and misinformation. Our libraries must be conspicuously the treasuries of news that stays news.
> . . . .
> I suggest, rather, that what we need--what any free country needs--is a knowledgeable citizenry. Information, like entertainment, is something someone else provides us. It really is a "service"! We expect to be entertained, and also to be informed. But we cannot be knowledged! . . . The autonomous reader, amusing and knowledging himself, is the be-all and end-all of our Libraries. (p. 113)

6.3. Conjunctional Definitions about People: To study human cognition

There were two instances of definitions in the literature focusing on the study of human recognition.

Mason, 1970:

> Yet although both librarians and information workers must, to some extent, be concerned with the physical and objective aspects of information, the larger part of our work is concerned with the subjective approach, that is with the effects of information upon people.
> . . . .
> [Information science] is best regarded as that body of tested theories and accepted facts which provides a common core to all good information and library practice, and . . . can be defined as the study of the processes involved in the exchange and correlation of knowledge. It will thus range from the physical, i.e. the quantitative measurement of information systems, to the psychological, i.e. the qualitative assessment of the effects of information systems and services on sentient beings, including here particularly the study of both the man/man and the man/machine interface. (p. 309)

Pratt, 1977:

> The sense of this word [emmorphosis] is restricted to changes in the image which cannot be specified precisely. . . . The meaning is further restricted to changes caused by the receipt of structured symbolic messages from other humans in order to distinguish this process from image changes caused by direct observation of physical phenomena. This restriction is imposed in order to avoid the applicability of the term to all possible image-altering stimuli. It also restricts the term to the area of greatest interest to information scientists, those phenomena which can be interpreted as human-to-human communicative efforts.
>
> In fact, it is plausible to restrict emmorphosis even more closely to refer only to changes caused by <u>recorded</u> structured symbolic messages; i.e., to graphic records of some sort. This distinguishes image-alteration resulting from reading (or more generally, experiencing) some graphic record from those alterations resulting from face-to-face interactions, conversations, and the like.
>
> The introduction of this term is in no way intended to define the scope and aims of information science, nor to define the communication process, nor to present a theory of the image. However, there does seem to be a need for a reasonably precise and specific term by which one can refer to the process of image change caused by messages from others. Much of the research carried out under the rubric of information science, and much of the work done in librarianship, is directly and intimately connected with the effects of graphic records on human attitudes and beliefs; (i.e., concerned with image changes caused by graphic records). (p. 32)

Comments

The definitional literature focusing on people does not adequately set forth a domain or domains, because the role of objects and functioning with respect to objects are excluded or treated as inconsequential. An exception to this is the class of conjunctional definitions identified in Section 6.3., the study of human cognition, in which the effects of graphic records on human attitudes and beliefs are proposed as a focus of domain problems. Nonetheless, since the study of human cognition is treated in the domain of cognitive studies or cognitive science and in the domain of epistemology, it is not

readily apparent what would remain for the domain or domains under consideration in the definitional literatures of library science and information science.

7. Conjunctional Definitions about Objects and People

Conjunctional definitions in the literature of library science and information science which meet the elementary criterion of a social domain, namely, that functions are specified with respect to both objects and people, are grouped into the following sets: 1) To make accessible; 2) To retrieve; 3) To transfer; 4) To process; 5) To counsel; 6) To link; 7) To create and transfer; 8) To create and use; 9) To use; 10) To analyze; 11) To evaluate; 12) To manage or control; and, 13) To mechanize. The table below summarizes generic and synonymous terms for each set of conjunctional definitions.

TABLE 12

CONJUNCTIONAL DEFINITIONS ABOUT OBJECTS AND PEOPLE

	Generic Terms	Synonymous Terms
7.1.	To make accessible	To keep accessible foster access facilitate access effect access gain access provide access provide accessibility increase accessibility make available
7.2.	To retrieve	To search join notify mention and deliver

TABLE 12--Continued

	Generic Terms	Synonymous Terms
7.3.	To transfer	To disseminate communicate distribute dispense create channels to pass transmit switch deliver present pass on facilitate communication facilitate transfer facilitate dissemination
7.4.	To process	To encode handle repackage deal with
7.5.	To counsel	To help cognitive development diagnose and prescribe align motivate effect self-mediation relate
7.6.	To link	To mediate intermediate match bring together gatekeep channel connect bridge
7.7.	To create and transfer	To prepare and distribute prepare and disseminate produce and provide produce and deliver generate and disseminate
7.8.	To create and use	To create and utilize create and exploit generate and exploit generate and stimulate use generate and use

TABLE 12--Continued

Generic Terms	Synonymous Terms
7.9. To use	To exploit maximize utility utilize assist in use
7.10. To analyze	To extract expose reveal classify interpret discriminate
7.11. To evaluate	To validate screen filter appraise
7.12. To manage or control	To organize
7.13. To mechanize	To computerize machine process exploit mechanically automate

7.1. Conjunctional Definitions about Objects and People: To make accessible

This set of definitions is illustrated by the following examples:

Besterman, 1945:

> [Anything] in which knowledge is recorded is a document, and documentation is any process which serves to make a document available to the seeker after knowledge. . . . Librarianship and the organization of information services, bibliography and cataloguing, abstracting and indexing, classification and filing, photographic and mechanical methods of reproduction: all these things and many others are the channels of documentation which guide knowledge to the inquirer. (unnumbered page)

Egan and Shera, 1949:

> "Bibliographic control" is a technical term that is apparently emerging in America for what Europeans call documentation. Of the two, the American name seems the more descriptive. In mechanics, a control is a device by means of which the energies of a machine may be directed to the achievement of a given end with a minimum of effort. Similarly, bibliographic controls are those devices used to direct intellectual energy in extracting from the totality of recorded information those portions relevant to a particular task with the utmost speed and economy.
>
> . . . .
>
> Historically, the table of contents and the index to a single book were the first instruments for locating specific information within the covers of that book. While books were still relatively few in number, libraries were able to gather the most essential within a single collection and to make them accessible by simple grouping or listing. (p. 17)
>
> . . . .
>
> Although the subject indexing of periodicals was begun in libraries, the task soon became too huge for a single library and the institutional framework of the profession hampered the development of large-scale cooperative centralization of such efforts.
>
> . . . .
>
> The next phase in the bibliograhic control problem came with the increasing publication by governmental agencies or corporations of an extensive literature whose content was of scholarly importance but was frequently accessible only through the listings and classifications of the issuing office. Much of this material is now in the form of special research reports, either unpublished or published in a form other than that of the traditional monograph or journal. Content accessibility to this material can be provided only through the indexed abstract which is made available to the potential user, whether the original is published or unpublished. . . . Here the crucial problem of classification appears in a new form, because the breakdown is so much more intensive than that required for complete books that it utilizes the unit of information rather than the publication unit and reverts to the philosophical problem of the classification of knowledge. (p. 18)
>
> . . . .
>
> Any approach to complete bibliographic control, in the sense of both physical and content accessibility, depends upon the coordinated efforts of many groups.
>
> . . . .
>
> If any one group is to take the initiative and attempt to provide leadership in the search for a general solution, it would seem that librarians are strategically well situated to do so. (p. 19)

Fairthorne, 1973:

> It seems fruitful to take the lowest task of the Information Sciences and Technologies, to wit "Notification" (bringing together Message and Destination, or conversely) to involve the six elements of . . . [destination, code, source, message, designation, and channel]. . . . (p. 72)
>
> . . . .
>
> Whatever the label, and whatever the level, it seems to me that the underlying task of the Information Sciences and Technologies is to manage, maintain, and make available diversity of discourse, diversity of its users, diversity of its uses, and diversity of its sources. In this we cannot fall back on the usual expedient of management, abolition of diversity by imposition of uniformity. A library consisting of one book, one author, and one reader, would not be diverse in one sense of 'information' however varied the bindings, type faces, and pseudonyms. (pp. 72-73)

Buckland, 1979:

> What is <u>characteristic</u> [of libraries]?
>
> . . . .
>
> <u>Indexing</u>, in its broadest sense, seems a good starting point. . . . The essence is description and labeling with the intent that some person or persons unknown can at some future time find material that will probably be useful to them. The phrase "information storage and retrieval" is appropriate, yet it has an aura of formality and machinery that seems out of character in a context that includes readers' advisors, storytelling, and information and referral. If we are to develop an adequate formal description then I suspect that "fostering access to public knowledge" is likely to be close to the mark.
>
> . . . .
>
> Meanwhile, there are two delightful phrases derived from Robert Fairthorne [1961] that, between them, sum up my view of our field. "Marking and parking" captures the essence of indexing broadly viewed. "Documentary discourse" can be taken to include the various relationships and interactions between author and document, between one document and another document, and between document and reader.
>
> . . . .
>
> However we may phrase it, it becomes clear that our "science" is not unique to libraries but pops up in a variety of areas such as: publishing, mass communication, archives, records management. (p. 426)

Berger, 1981:

> Do we, as information service providers, see a role for ourselves in the future?
>
> . . . .
>
> We can make a valuable contribution in this information age, by providing access to services, by identifying services that are needed and do not exist, by developing these, and by evaluating the effectiveness of these services against user needs. (p. 14)

Comments

These definitions indicate the broad conception of the domain of library science and information science that is encompassed by the terms 'accessibility', 'access', and 'availability'. Egan and Shera (1949) identified physical and content accessibility as synonymous with 'bibliographic control' or 'bibliographic organization'; these terms were taken to include the operations of indexing, grouping, listing, classifying, and abstracting. Buckland (1977) described access to recorded information as 'the transmission of knowledge through records' (Appendix II, Section 7.1.). Williams and Pearce (1978) noted that organizing and controlling the preserved literature of society were essential activities in order to prevent inaccessibility (Appendix II, Section 7.1.). Dervin (1973) conceptualized a set of five 'accessibility factors' in an urban information system which could function both as linkages and as barriers. The five accessibility factors were taken to be: societal accessibility, institutional accessibility, physical accessibility, psychological accessibility, and intellectual accessibility (pp. 15-16; also in Appendix II, Section 7.1.). Along similar lines, Foskett (1965) had observed a conceptual evolution in the notion of librarianship from the function of limiting access to ensuring access:

> [We] can readily see that it [librarianship] is above all a <u>social</u> activity. What began, in palace and temple, as a guardianship to prevent general access to precious documents, changed in the course of time to a role of protecting these charges from dangers precisely in order that they might be used long after the writers themselves had died and were no more able to give personal instruction. (pp. x-xi)
> . . . .
> Librarianship came to mean the process of bringing books and readers together. (p. xi)

The primary difficulty with this set of conjunctional

definitions is that two related but separate actions are conflated: the action of intermediaries who provide access to objects and the action of people seeking access thereto. A more adequate conception of the domain must recognize and specify separate functions for intermediaries and users; access functions are developed more fully in Chapter Five of the present inquiry.

7.2. Conjunctional Definitions about Objects and People: To retrieve

This set of conjunctional definitions about objects and people encompasses a relatively small collection of instances, in contrast to the very large number identified in the definitional literature of information science in Chapter Three. The following illustrations indicate the nature of this class.

Fairthorne, 1965a:

> One of the purposes of this symposium is to consider the tools of documentation and information sciences, . . . (p. 89)
> . . . .
> The distinction between use and mention is essential here. The whole point of information services is that inasmuch as "information" is a thing at all--which it isn't--the services don't use information, they only mention it. A librarian does not use books on chemistry unless he happens to be a chemist, and when he uses them as a chemist he is not acting as a librarian. As a librarian he only mentions the books and the words in them.
> We are dealing here with linguistic expressions that represent, at best, people's opinions or exhortations or intentions. (p. 90)
> . . . .
> Here we must get into our minds that we deal with records. Also we deal to a certain extent with interpretations of these records, but only inasmuch as interpretations affect people's behaviour when dealing with records. Thus our field is a sub-sub-sub-section of sociology; that part that deals with how people write, use, and ask for records.
> We are not concerned with meaning at all, other than at this level. Inasmuch as we inform anybody about anything in an information system, we merely notify them about records. As I remarked some eighteen years ago, the job of a librarian is to give information

> about information. That is, to tell people about records. There is no need to use the word "information," for if you want to inform somebody you have to tell him first. That is, we notify people of records. . . . We do not use the records ourselves. An information system is therefore a tool.
> . . . .
> Information systems are tools. Tools cannot use themselves. To discuss a tool properly you must disassociate it from particular applications. (p. 91)
> . . . .
> This is what we must do in any activity. Disassociate actions of information systems from their applications, and look the first square in the face. Then you can join them again to deal better with real life situations. (p. 93)

Asheim, 1971:

> Thus some of the most interesting and revolutionary developments in library service occurred first in science libraries where it became apparent that the old approaches to information were no longer adequate to meet the demand for immediacy and specificity. The term "Information Retrieval" stems from this new approach to what used to be called reference work. . . . Especially in government and industry, the science librarian, or Information Officer as he is now often called in technical operations, is frequently considered to be that member of the research team whose special expertise is the literature of the subject. (p. 34)

Lancaster, 1973:

> [The] broad area of information storage and retrieval . . . is perhaps the heart of information science as it affects the librarian. While librarians have been concerned with information retrieval for centuries, traditional approaches to storage, retrieval and dissemination problems have tended to break down. Many new approaches to these problems have been developed in the past 25 years, mostly from outside the library profession. Only a decade ago, the librarian was concerned almost exclusively with printed books and journals and with printed indexes to these. (p. 128)

Comments

The comments noted in Section 7.2. of Chapter Three are equally relevant to the set of conjunctional definitions identified here. The conceptual ambiguity of Mooer's neologism is exemplified by the divergent usages of the term 'retrieval'. Besides a synonym for 'reference

service', retrieval has been taken to describe the entire domain of information science. Bohnert (1974), for instance, observed that:

> Fairthorne introduced his theory [of the field of notification] in the 1960s to help clarify thinking on the foundations of what was then called 'information retrieval' and is now called 'information science'. (p. 210)

At the same time, however, retrieval was also taken by Taube (1961), among others, to signify 'information handling', which in turn he used as a synonym for 'advanced cataloging' and also as a synonym for "the more glamorous term 'documentation'" (see Section 5.2. of this chapter). 'Information handling' is a vague term reviewed under the generic term 'to process' in Section 7.4. below.

Thus, the hoped-for precision of the term 'retrieval' has not been realized, and thus can not be considered adequate to mark off a domain or domains of library science and information science.

7.3. Conjunctional Definitions about Objects and People: To transfer

This set of conjunctional definitions includes such terms as dissemination, communication, distribution, dispensation, transmission, delivery, presentation, and facilitation of the above-mentioned actions. Illustrations from the definitional literature follow.

Shera, 1953:

> Now, the A.L.A. [American Library Association] can view, with apparently no sense of alarm whatever, the recent action of the documentalists and other specialists in the dissemination of technical information in forming a professional association of their own that looks for guidance more toward Europe than America. . . . What has happened in England, where there was a devastating schism between the documentalists and the special librarians, on the one hand, and the public librarians, on the other, which brought immeasurable professional harm to

both camps, can, but must not, happen in the U.S.A.!

. . . .

There is a hard core of detailed knowledge concerning the use of graphic communication whereby the segments of a culture communicate within themselves and with each other. This discipline is dominantly historical, . . . (p. 48)

Vickery, 1975:

The paper discusses the content of library and information studies, and possible definitions of "information science". (p. 153)

. . . .

L and I [library and information] services are intermediaries in one form of human communication--distinguishable on the one hand from personal communications (conversation, letter) and on the other from mass communications (newspaper, broadcast, cinema, poster).

. . . .

L and I services are centred on documents--all forms of recorded communication, whether verbal, musical, graphic, digital or any other. Documents are produced, often reproduced, and transferred for use. Our service is essentially that of transfer, but we must have an appreciation of the other phases of the cycle. (p. 154)

. . . .

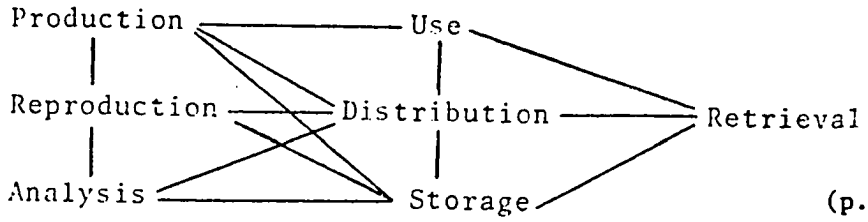
The documentary cycle can be expanded . . . to make it explicit that 'transfer' involves the four primary functions of document analysis, storage, retrieval and distribution. (p. 155)

. . . .

We are concerned with people using documentary systems to enlarge their knowledge. (p. 159)

. . . .

DIAGRAM 3



(p. 154)

Greer, 1981:

Traditionally there are five basic functions which the library and librarianship perform for society--archival, cultural, educational, recreational and informational. The author states that library education has been, and still is, mainly directed towards the archival function. Even the primary forms of the informational system, has been based on the reactive use of stored material. The author maintains that the system should be assertive and dynamic. A theoretical model for information transfer is described. The roles of librarians, information scientists and information managers are analyzed with relationship to this model and in context to the five functions described

above. (p. 77)

. . . .

[The] archival function has been and must remain a primary responsibility of librarianship and information science. . . . Its goal is achieved when all possible materials are identified, acquired, organized, stored and made accessible.

. . . .

[In the archival function,] preservation of the record is primary, conditions of access secondary. (p. 83)

. . . .

The information scientist does not compete with librarians for the managerial role of the library. In this conceptual model, the information scientist's function focuses almost exclusively on the design of internal systems of organizing and retrieving knowledge. For example, the catalogers of the typical library fulfill the role of information scientist, as do the designers of specific bibliographic data bases such as Chemical Abstracts or The National Union Catalogue. In addition to the design of data bases, the information scientist must be thoroughly conversant with technological developments for storage, retrieval and the linkage of various data bases regionally and nationally.

. . . .

In other words, the information scientist assembles a collection of packages in a specific generic data base while the librarian assembles the various data bases in an organizational structure.

. . . .

The information manager . . . must be able to identify, organize, store, retrieve and disseminate words, paragraphs and single sheets of paper if they represent discrete records of a link in the information transfer process. In this respect, with the exception of the dissemination function, the information manager applies the tools of the archivist or records manager. (p. 84)

. . . .

At the operational level the librarian must specialize in management functions; the information scientist in data organization, storage and retrieval techniques and technologies; the information manager in communication theory and archival competencies. (p. 85)

Comments

As was noted in Section 7.3. of Chapter Three, the term 'transfer' is used ambiguously in the definitional literature. It appears to be a purely descriptive term like 'information flow' and so does not indicate a specific function or functions being performed

in the domain or domains under scrutiny here. The most extreme conceptualization of 'information transfer' is a recent one by Landau, Maddock, Shoemaker, and Costello (1982):

> In most information transfer models, the delivery of an information package is not the goal it commonly is in the more traditional package-oriented library or information publishing systems. Information transfer is behavior-oriented; it is concerned not only with the transmission of ideas, but also with the impact of these ideas on the users. Information (and technology) transfer emphasizes the adoption of a particular idea, concept, or technology as its major objective.
> . . . .
> [The] innovation/diffusion process can serve as an appropriate basis for a comprehensive information transfer model. (p. 83)

In addition, the notion of 'transfer' as used in the definitional literature does not sort out who is initiating the transfer and what function the recipient can be said to perform in the transfer activity. Furthermore, the transfer function suggests a completed action and thus conflates the function of the mediating agent and the receiving user; transfer is too board.

The more fully developed theory of 'notification' by Fairthorne (Section 7.3. of Appendix II and Section 7.2. of this chapter) as a conceptual basis for the domain of information or message transfer systems deserves further comment. Fairthorne characterized 'notification' as the delegation to an intermediary of the function of searching for and delivering objects of interest to the delegator. This conceptual model is a promising approach, but a number of ambiguities are present. First, the intermediary's role in the object transfer system is unclear; the intermediary is not shown as an element within the system, so that interrelations with other system elements such as authors and users are thus not mapped out. Moreover, the system is

not related to its surroundings, the larger society.

7.4. Conjunctional Definitions about Objects and People: To process

This is a relatively small set of conjunctional definitions, encompassing the manipulation of objects for use by people.

Shaw, 1958:

> When you look at what documentalists do, instead of what they talk about when they go to meetings, you find that they deal with recorded information. So do librarians. You find that they try to deal with the content of recorded information. So do librarians.
> . . . .
> [A] term was borrowed from Europe--"Documentation"; but it doesn't mean quite the same thing here as it does there because, traditionally, a library in Europe is a very static sort of organization. If you want a book and you are properly accredited to get past the guards at the door, you turn in your request and come back two weeks later and maybe you get the book. When they have done that, they have done the job of library work, and that's it! Now the idea of answering a reference question in a library was foreign to the regular European library tradition so that those who set themselves to answer reference questions out of the library books called themselves documentalists.
> . . . .
> Special librarianship had lost its "zing" in terms of being able to get higher pay or more resources [in the United States], so we called the new, or allegedly new activity, documentation, and we explained to scientists and other intellectual types that through documentation we were getting closer to them. . . . I think this phase is also running out so now we have another new name. It is Scientific Information this week and, quite likely, after a while, since we haven't solved anything and we haven't improved anything, we'll change that name to something else again. (p. 4)
> . . . .
> We have then new orders of speed, of intensity and of size to be coped with and these require new orders of information supply--and no excuses. This means that we are now concerned not only with putting two subject headings on a book but with being able to find any idea on any page of any patent, or any page of any document, or any page of any book. (p. 6)
> . . . .
> We have seen some examples . . . in documentation--that activity we have been calling documentation, or advanced librarianship, or advanced reference work, call it what you will. (p. 46)

. . . .

Basically documentation is a further refinement and intensification of normal library service as we see it in most libraries. (p. 56)

Havard-Williams and Franz, 1974:

> The quantity of information and the complexity of modern knowledge transfer has led to the growth of information science and of library studies or library science. (p. 4)
>
> . . . .
>
> The importance of documentary information work in modern technological society cannot be gainsaid. (p. 26)
>
> . . . .
>
> Personnel is the key to modern information handling.
>
> . . . .
>
> Information work exists to make the transfer of knowledge more effective. Knowledge makes understanding easier. Understanding contributes to the peace of the world. Every worker in the field of information library archive work makes a contribution in this sense and this is what makes the activity worthwhile. (p. 27)

Garrison, 1977:

> We have not yet achieved a curriculum, core or other, that builds deliberately from the distinguishing characteristics common to all information handling activities. Where we should be talking in terms of the principles involved in acquiring, screening, cataloging, storing, repackaging, and providing access to information of all kinds we still spend most of our time talking about institutional techniques of information handling in libraries. (p. 179)

Comments

This set of definitions does not describe the specific functioning of a domain or domains, but encompasses rather a collection of general terms deriving from computer science and now widely used in the vernacular. The primary difficulty with this class of terms is that the functioning of users is not described; the focus is on object manipulations. Thus the social nature of the domain or domains of library science and information science is ignored.

7.5. Conjunctional Definitions about Objects and People: To counsel

This set of definitions is illustrated by the following.

Penland, 1971:

> [The] cybernetic model . . . posits that counseling and information retrieval are two sides of the same coin. The librarian may protest that he is neither a counselor nor a media expert preparing and transmitting messages to audiences. This may be so, but unless the librarian understands the function of these two professional emphases, he is in danger of becoming a manager of a stockroom where no one enters who does not know exactly what he wants.
>
> . . . .
>
> More often than not, the individual coming to the library needs help in developing labels for his experience and in talking to someone who will listen with an information-oriented ear. . . . Counseling is essential to help the patron develop cognitively and to achieve such a level of concept growth as will make it possible for him to place labels on his experience. . . . (p. 456)
>
> . . . .
>
> The cybernetic model of communication has immediate implications for the library and information profession in two areas: counseling versus retrieval, and in communications producing situations versus message design. (p. 453)
>
> . . . .

TABLE 2
Elements of a Communication-Producing Profession

Disorder	Order	Communicative (control) devices, major professional goals
Theory lacunae Research lacunae	Promote theory construction, research, publishing and compendia writing in: sciences social sciences humanities	Theorem 1: Acquire one copy of everything placed in the public domain Theorem 2: Organize documents for recall and information retrieval Bibliographic control Networks and systems
Personal lack of education	Promote education: elementary, secondary, college, liberal education Promote consultation Promote reference	Theorem 3: Promote use of information in people's lives Group work services Individual services Advisory counseling Reference retrieval
Social disorder	Promote social order, institutions, agencies, organizations, informal groups Motivate to participate through the mass and other media	Theorem 3: Promote use of information in people's lives and communities Community development and coordinating structures Motivate to learn through the mass and other media

(p. 453)

Hershfield, 1973:

> [Let] Library Science concentrate on studying human information seeking and processing behavior in different environments, human information needs and the systems whereby those needs are satisfied. (p. 15)
>
> The adoption of this sort of orientation . . . would be a first step in the development of the broader view of librarianship which seems, thus far, to have been lacking in the profession and the society at large. Practitioners as well as researchers would learn to focus on human information needs, human information seeking behavior, and the design and operation of information systems structured to serve different client groups. Library educators would continue to be concerned with recorded materials, but their approach to the study of the acquisition, organization, storage and retrieval of information resources would be dictated by their knowledge of and concern for human beings, rather than the acquisition and organization of media as ends in themselves. . . . (p. 16) [Assuming this approach,] the profession could move a long way toward the elimination of the distinction between librarianship and Information Science. (pp. 16-17)
>
> Moreover, practitioners . . . probably would find a much wider range of employment opportunities open to them than has thus far been the case. They would be information counselors, capable of linking clients with the information (in whatever form) they might require. (p. 17)

Debons, 1978:

> The information counsellor will be expected on occasion to instruct the user on how to use the various data-information resources. In general, this competence is considered to be major for the information counsellor and perhaps distinguishes the counsellor from other professionals in the information field, who may be considered to play a more disseminating/dispensing rather than prescriptive role. (p. 488)
>
> . . . .
>
> The information counsellor performs a role that is essentially different from the librarian or reference librarian. The information counsellor is a diagnostician and an educator. Knowing the user thoroughly, his motives, his habits, etc., the information counsellor can align the nature of the information resource to the user's particular idiosyncratic proclivities. The information counsellor is part of the task facing the user, and not apart from it. (p. 492)

Comments

The concept of 'information counselling' argues that the function of counselling can be defined by reference to objects rather than by reference to human attitudes, beliefs, and behaviors. Counselling,

however, is client-centered rather than object-centered. Just as with respect to the teaching function, there is a content to be taught. The teaching function is not transformed into another function merely by a change in the teaching content; it is still teaching.

Moreover, the concept of 'counselling' is not synonymous with 'linking clients with required information', as Hershfield (1973) argued; nor do the roles of 'diagnostician and educator', as suggested by Debons (1978), constitute the functional equivalents of information counselling taken as 'aligning the nature of information resources to the user's proclivities'; nor does the counselling function have as its primary focus the 'facilitation of learning (both affective and cognitive) by establishing a relationship between materials production and the patron', as Penland (1974) asserted (Appendix II, Section 7.5.). The terms 'linking', 'aligning', and 'relating' are not conceptually synonymous with the term 'counselling'. Thus, these conceptions of counselling are at variance with the extensive literature on the subject; they constitute distorted and so inadequate usages of the term. 'Information counselling' is a rhetorical distinction without a conceptual difference.

Thus, the term 'counselling' describes the functioning of the domain of counselling psychology or counselling social work, but is an inadequate conception for marking off the domain or domains of library science and information science.

7.6. Conjunctional Definitions about Objects and People: To link

This set of definitions encompasses related terms such as 'to

mediate', 'to match', 'to relate', 'to bring together', 'to channel', 'to connect', 'to bridge', and 'to broker'. Illustrations from the literature follow.

Shera and Egan, 1950:

> Basically, the task of bibliographic organization is the matching of two patterns: (a) the pattern of all those human activities in which the use of graphic records plays a part, and (b) the entire pattern of intermediary services which transmit recorded materials from the producer to the ultimate consumer. . . . [From] bibliographic organization, as it is to be understood in the pages that follow, must be eliminated the great bulk of all mass communication media; communication which is completely under the control of the transmitting agent, e.g. radio broadcasting, the daily newspaper, the motion picture, for such are of concern in bibliographic organization only when they, or a sample of them, are transmitted through time as historical documents. Bibliographic organization, then, is concerned with indirect communication in that it encompasses those parts of the process of communication which require intermediary agencies or services. (pp. v-vi)
> . . . .
> [Bibliographic] organization presupposes the existence of such an intermediate agent between the producer and the consumer of the recorded word, . . . (p. vi)
> . . . .
> No solution can be regarded as satisfactory unless the resultant system of bibliographic organization directs the inquirer to the material which he needs, indicates its location, and provides the means for placing it before him. (p. vii)

Asheim et al., 1972:

> The central concern of librarianship is with the materials of record, with those who use (or could use) records, and with the most effective means by which records and the people who have need of them can be brought together. In this statement may be found the key to the nature and scope of the discipline of library science, and it is worth considering further its practical implications, in terms of the library's contribution to society. The principal forms taken by the contribution are the following:
>
> 1. The preservation and transmission of the cultural heritage.
> 2. The support and furtherance of economic, scientific and technological development.
> 3. The support of the educational process--both formal and informal--at all levels.
> 4. The servicing of one of the most significant forms of leisure-time activity--recreational reading.
>
> These functions are performed by libraries and information units. (p. 81)

Gardner, 1980:

> The librarian who can act as an information broker and fill--or better yet, anticipate--the information needs within the organization has become an information manager. It's information delivery in the active rather than passive mode; proactive marketing rather than reactive response. (p. 376)

Comments

Like the notions of transfer and processing, the linking function is too ambiguous and too general to describe the unique functioning of a domain or domains. In addition, it focuses on the action of an intermediary and ignores the nature of the receiver's functioning.

7.7. Conjunctional Definitions about Objects and People: To create and transfer

This set of definitions encompasses related terms such as 'to prepare', 'to produce', 'to generate', 'to distribute', 'to disseminate', 'to provide', and 'to deliver'. Examples from the literature follow.

Taube, 1952:

> Special librarianship is concerned with the collection, identification, organization, and servicing of items of recorded information (i.e., documents) for the achievement of special purposes. Whatever these "special" purposes may be, as opposed to the general educational purpose of a public library, they determine the nature and scope of the activities designed to achieve them.
>
> Documentation as the designation of the total complex of activities involved in the communication of specialized information includes the activities which constitute special librarianship plus the prior activities of preparing and reproducing materials and the subsequent activity of distribution. In essence documentation is an amalgam of librarianship and publishing with the added responsibility of preparing or causing to be prepared the materials

to be published, collected, organized, serviced, and disseminated. This last element is the weak spot of our definition. There are those who would leave out the actual initial preparation of materials although it is recognized that documentation does include the preparation of bibliographical and reference material, i.e. the so-called "secondary publications." To the extent that responsibility for preparing primary materials is corporate rather than individual and to the extent that the initial preparation is guided and determined by the ultimate purpose of distribution to a special audience, I think that preparation of the document is a part of documentation. (p. 166)

. . . .

In essence, the material produced by documentation activities . . . corresponds to the old vertical file material that wasn't worth the type of organization usually accorded to books and periodicals. But the growth of this documentary or report material converted a peripheral concern to a central activity. The important content of these reports seemed to justify not less, but more organization than that accorded to books and periodicals. And suddenly the fetters of traditional librarianship burst. The finished schemes of the nineteenth century could not contain the swirling rush of new literature and new forms of literature. New systems had to be created, new methods of publication and dissemination devised, new methods of identification and organization devised. (p. 167)

Reynolds, 1974:

More to illustrate these differences and not to demonstrate a hierarchy of value, librarianship has been and is now essentially concerned with serving readers with a collection of artifacts containing information (usually books) by organizing the collection for use and by providing some indication of the authority of the contents of the collection. Information science (which like librarianship has already taken on the characteristics of a global term and is in the process of producing such subsets as documentation and information engineering) is concerned with organizing information for use. Librarianship and information science therefore arise from the same need--the need to provide a client with information.

. . . .

Fundamental to these differences [in approach to the same functions] . . . between librarianship and information science are the character of the client and the degree of his urgency. The librarian is responding to a client group which does not generally expect or demand that the library provide them with information and not literature. . . . The scientist/technician, apparently dedicated to the exigencies of a technological society, is capable of generating urgencies that the library patron cannot. Consequently, an attempt is made to reduce the enormity of information with which he might deal by careful selection, analysis, intensive organization--even production. (p. 583)

. . . .

[Library education] has attempted to abstract from the foundations associated with the information transfer process, those concepts

(i.e., classification, reference, administration of an information related agency) which are presumably common to all activities related to the control of recorded discourse. (pp. 583-584)

Taylor, 1979:

> Librarianship is too important a profession to be tied to the fate of a single institution.
>
> . . . .
>
> [We should] think in terms of functions served rather than institutions preserved . . . in terms of the movement of messages rather than the storage of packages . . . of designing services for people of all levels of sophistication rather than only for those who enter a building called a library. (p. 364)
>
> . . . .
>
> [The librarian's skills are] the ability to organization information; knowledge of the variety, range, and usefulness of information resources; a commitment to service, i.e., a sensitivity to needs and uses of information and a desire to match those needs. Once these are seen outside the context of the library, they are a unique and extraordinary set of skills, useful, in fact, critical to our society.
>
> Where do all these positions exist? First of all, a whole new industry is growing around and parallel with the library. This information industry, narrowly conceived, is basically concerned with generating, acquiring, selecting, organizing, packaging, retrieving, and disseminating a commodity called information. Narrowly conceived, this industry is document-based rather than information-based. This portion of the industry includes index and abstract creators, data base publishers, automated library systems, software producers, micopublishers, reference book publishers, newsletter publishers, information-on-demand companies, and information facilities management. Most of these industries did not exist 10 years ago. And they are hiring people called librarians.
>
> . . . .
>
> This information industry is only the tip of the iceberg. If we look at any kind of societal insitution and ask how it acquires, organizes, processes, retrieves, and disseminates information, we suddenly realize that most of these processes go on outside the library, yet make use of many of the skills that librarians have. (p. 366)

Comments

The function of creating objects is used ambiguously in the definitional literature to mean both original discovery and the production of artifacts; these, however, are distinct and separate notions.

Moreover, neither is adequate for describing the functioning of the domain or domains under consideration. Creation is the function of researchers, scholars, artists, and authors, while the production of artifacts is the function of publishers or, in the case of the visual arts, of artists themselves.

7.8. Conjunctional Definitions about Objects and People: To create and use

This set of definitions includes such terms as generation, utilization, exploitation, and stimulation of use. Illustrations from the literature follow.

Godet, 1939:

> Already current in historical circles about 1870, it [documentation] then referred to the collecting of documents or to a collection of documents. Messrs. Lafontaine and Otlet took possession of the word, and at the beginning of the century gave it a wider meaning when they advocated "the systematic organization of information and of documentation." It now means, as defined by the French Union of Documentation Services, "the identification, the investigation, the assembling, and the use of documents," the "documents" in addition to printed matter comprising manuscripts, or drawings, or objects collected for purposes of evidence, verification, or study. Thus defined, the field of documentation takes in the libraries, the collection of archives, the museums, the work of publishers, of printers, and even of authors; . . . (pp. 185-186) So it seems there should be no separation of libraries from documentation, since the former are merely a special form of the latter, and every library may claim to be a center of documentation.
>
> But such is not the case. In many instances, and especially in the phrase "center of documentation," the "documentalists" give the word a far more restricted meaning. "A center of documentation," they say, "is not necessarily a library, and all libraries are not centers of documentation"; so once again the two conceptions are opposed.
>
> In this way the libraries find themselves a part of documentation or else excluded from it, depending upon whether the word is used in the general or in the restricted sense. (p. 186)

Cohan and Craven, 1961:

> Science information personnel: the new profession of information

combining science, librarianship and foreign language. (title page)

. . . .

With the possible exception of library science, prior efforts in information work have been fragmentary and parochial. What was lacking in these past endeavors was a unified, systematic approach to the entire cycle of information, joining in a more effective liaison the creator, the processor, and the consumer of information. . . . This information cycle has been subdivided into many individual and detailed processes, but it may, in general, be considered as: creation, publication, identification, recording, organization, storage, recall, conversion into more usable forms, synthesis, dissemination, interpretation, and utilization. (p. 1)

. . . .

Elements of science information work: Administering, Locating Materials, Selecting Materials, Acquiring Materials, Descriptive Cataloging, Subject Analyzing, Abstracting and/or Annotating, Performing Reference Work, Literature Searching, Transmitting and Copying, Translating, Converting into Machinable Form, Developing of Information Systems, Investigating of Machine Applications, Information Interpreting, Research with Information, Information Scouting. (p. 5)

. . . .

The result has been a trend to unify library, patent, translation, report writing, archival, abstracting, literature research, editorial, communications, and publication activities within a single information facility. (p. 11)

. . . .

Obviously, the elements of information work and librarianship overlap. . . . But the full spectrum of science information activities is now more complex than most librarians have been prepared, by education and experience, to solve. Librarianship does not concentrate in depth on identification, conversion into different forms, synthesis, dissemination and interpretation of scientific information. (p. 13)

Halm, 1978:

We have found a number of other definitions which . . . emphasize the communicative aspect of information and the cycle of information transfer, which are applicable to our profession: generating; presenting, using some kind of vehicle of transfer (carrier); collecting, storing, accessing, disseminating; stimulating its use. The complete cycle of information transfer, using a document as carrier, is called documentation. (p. 11)

Comments

This set of definitions encompasses not only the creativity function but also the utilization function. Mohrhardt (1964) equated

the notion of 'analysis' with 'exploitation'; the latter, however, is more generally synonymous with the notion of 'use' and so this purported equivalence is at variance with accepted usage of the term. Cohan and Craven (1961) included translation among the elements of the domain of science information work; translation, however, is neither discovery nor use, but constitutes the function of expressing one set of linguistic symbols in terms of another set of linguistic symbols. The translation function marks off a unique intellectual and social domain apart from the domain or domains under consideration here.

Thus the notion of object use is inappropriate as a focus for the domain. Use is the function of users, consumers, researchers, scholars, artists, and authors, not of mediating agents.

7.9. Conjunctional Definitions about Objects and People: To use

Included in this set of definitions are such related terms as 'to exploit', 'to maximize utility', 'to assist in use', and 'to utilize'. Illustrations from the literature are the following.

Briet, 1950:

> Librarians employed in them [the great national or encyclopaedic libraries comprising separate departments] are becoming specialists in a particular type of work when they are not specialists in a particular branch of study, and they are lucky when they are allotted to work in tune with their own cultural background.
>
> This situation is making it difficult to maintain the distinction which some people are trying to establish between librarians and information officers. According to Wright, there are two factors which confer a special character on the work of the "special libraries" (Information Bureaux). The time factor implies: speed, efficiency, access to the shelves, energy. The specialization factor means that the technician must be familiar with the contents

> of the works in his charge. . . . [A conventional definition is] given by Mr. P.S.J. Welsford: "The duties of the special librarian are to collect, arrange and make available all material (books, documents, pamphlets, articles, cuttings, films and other photographic records, gramophone records, etc.) relating to the field or fields of study in which the library is concerned. (p. 49)
>
> . . . .
>
> The duty of the Information Officer, when one is considered necessary in addition to the Special Librarian, is to exploit the information thus made available in the capacity of agent for the clientele for which the library is provided..... The Information Officer, in this case, must be an expert in the particular subject and subject bibliography of special interest to the institution he serves; and no knowledge of library technique beyond that of a trained user of libraries is necessary to him as agent between research workers and the librarian..... When the appointments of Special Librarian and Information Officer are combined in one officer, he requires the qualifications of both: i.e. subject specialization, and training and certification in librarianship."
>
> . . . .
>
> It has often been said that the special librarian is principally distinguished by his "attitude". In the "Dictionary of Occupational Titles" of the United States Department of Labour, no distinction is made between the two types of librarians. The designation "reference librarian" seems, in the absence of an alternative, to correspond to the English title of "information officer" and the French "documentaliste". (p. 50)

Coblans, 1974:

> [Librarians] and documentalists--all those who handle information in some form or other. . . . [We] communicate by language, be it spoken or written, and the record provides that continuity, that accumulated knowledge transmuted at best into wisdom, which has given man his place in the pattern of evolution. The safe-keeping and the proper use of that record is our business and makes our profession difficult, but important and worthwhile. (p. 11)

Horton, 1979:

> The information Manager directs the overall organizational information management program or a major subcomponent thereof. The program encompasses the coordination and synthesis of the many disparate functional activities and programs in an organization which support its data, information and knowledge needs. These include libraries and information centers, automatic data processing programs and computer centers, archival and records programs, telecommunication systems, statistical programs, word processing, micrographics and other microforms, printing and publishing, copying and reproduction, paperwork management, reports control, forms management, management information systems, scientific and technical information programs, and other related activities.

. . . .

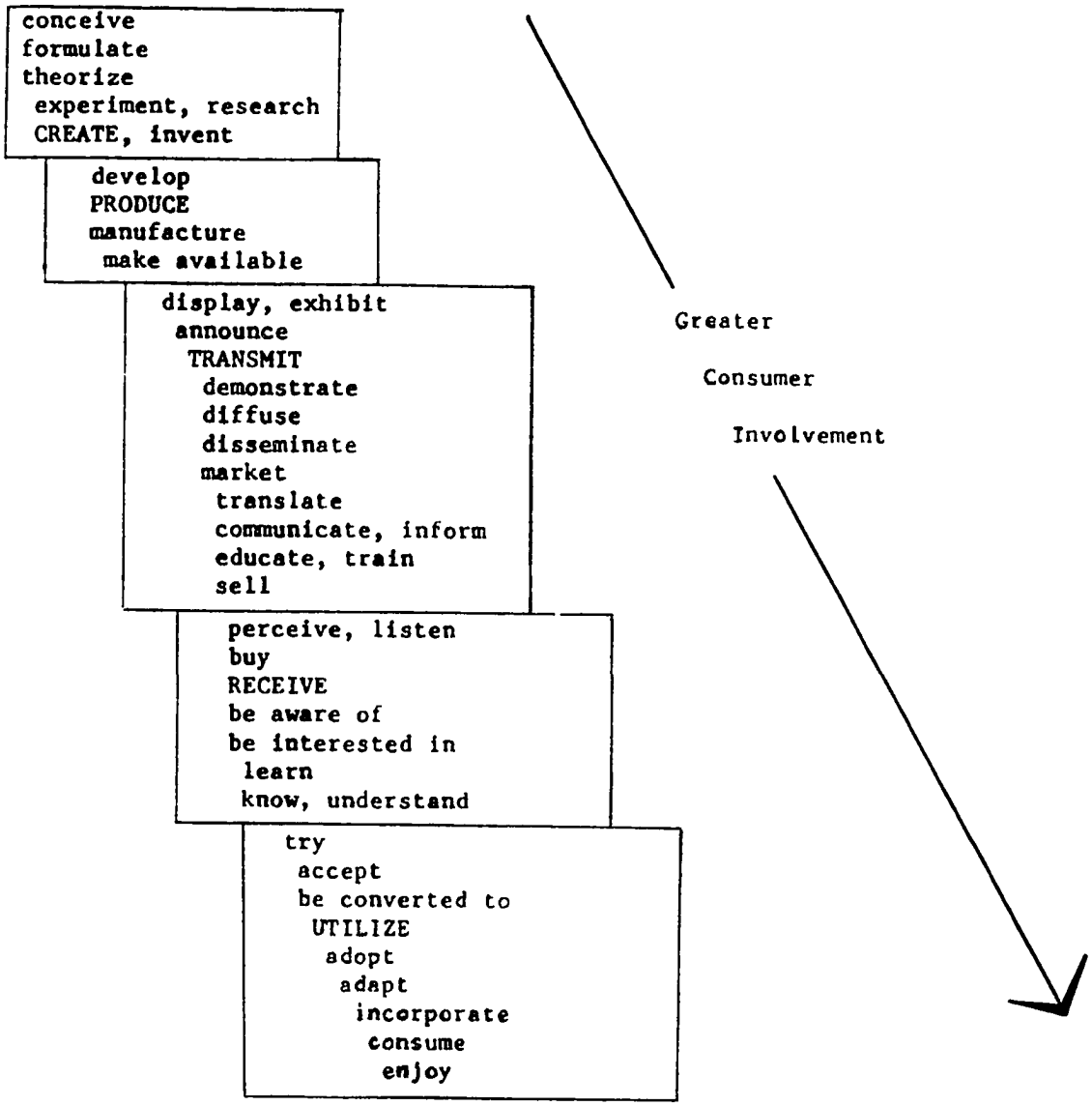
> Like the organization's other resource managers--for example, its personnel, financial, and physical plant managers--the central task of the Information Manager is to see to the efficient acquisition and use of information resources and the effective application of those resources to meet the organization's information requirements. By "resources" is meant all of the facilities, equipment, personnel, supplies, systems and other machinery needed to collect, store, handle and disseminate the data, information and knowledge. Ultimately all of this information handling machinery is utilized to furnish accurate, timely, complete and relevant information to users throughout the organization for decision-making and problem-solving. So, in the end, the Information Manager must be concerned with <u>both</u> resources (machinery) and the usefulness of the information itself. (p. 36)

Comments

As the previous section indicated, the function of use is in the domain of users and consumers. Moreoever, the mediating agent's 'use' of objects is conceptually distinct from the user's 'use'. Briet (1950), for instance, conflated the information officer's function of 'exploiting' information with the function of using the information, but the function of preparing or making ready for use is conceptually distinct from user exploitation. Also, 'assisting in use', suggested by Asheim (1971), is conceptually distinct from preparing or making ready for use (Appendix II, Section 7.8.).

Coblans (1974), among others, has argued that the function of the domain or domains under consideration here ought to include 'the proper use' of information or knowledge. The notion of 'proper use', however, is not in the domain of mediating agents, but rather is inherent in the use or consumption of information or knowledge and so is part of the domain of users and consumers. Havelock (1968) has identified a sequence of generic processes and synonymous terms of

dissemination and utilization of new knowledge ordered according to increasing directness or immediacy of the receiver's consumption. The sequence begins with the creation and production of knowledge, extends through transmission taken as the function of a 'sender', and ends with the receiver functions of 'receiving' and 'utilizing'. The diagram below illustrates the knowledge utilization system.



"Concepts Related to Utilization" [title supplied] (p. vii)

This diagram assists in illustrating that the domain of use is separate from the domain or domains under consideration in the present inquiry. Indeed, it may be pointed out that Havelock's conceptualization ignored the functioning of the domain of mediating agent which is of interest here. This state of affairs is particularly enigmatic because of the frustration expressed by Havelock (1969) about the tremendous scatter of source literature relating to knowledge dissemination and utilization research; in fact, an immediate priority in the field was considered to be the establishment of a central source for identifying and bringing together the research literature, for organizing it, for storing it, and for making it generally available (p. 11-3).

7.10. Conjunctional Definitions about Objects and People: To analyze

This set of definitions is unique in the definitional literatures of library science and information science as the primary focus of domain functioning. Related terms identified were 'to extract', 'to expose', 'to reveal', 'to classify', 'to interpret', and 'to discriminate'. The following examples characterize the functioning.

Godet, 1939:

> The center of documentation, then, will do more than assemble documents; it will undertake no less to work them over into summaries, to extract the useful material and make it available, on cards or in analytic and detailed indexes, always up to date. . . . These hasty remarks will serve to sketch the main features of documentation (sensu stricto) which we shall summarize in four words: specialization, up-to-dateness, practicality, and mechanization, in so far as the last is possible in intellectual affairs. (p. 187)
>
> How does all this appear from the library point of view?
>
> . . . .

In the first place, one must grant that most of the great general libraries, at least in Europe, do not furnish documentation in the restricted sense and could not furnish it. (p. 188)

. . . .

In the second place, one must recognize that the field of documentation overlaps that of the libraries. . . . All sorts of new processes offer methods of reproduction more convenient than printing. Films and disks offer new ways of preserving and distributing pictures and thoughts. Are the libraries to enlarge their field of operations, to take over the new kinds of documents? They probably can do so only to a very slight extent. (pp. 188-189)

. . . .

In the third place, we should grant, or rather state, that the scholarly libraries, while they share the ambition of the centers of documentation to facilitate intellectual work, cannot follow them in one direction without denying their raison d'etre. For the documentalists, the ideal would be so to extract useful material form the documents that the user would find it all ready with nothing more for him to do except sometimes to pay for it. As a refuge for culture, the library may suppose that this policy of doing work for the worker, of easing the task, is entirely right and proper in practical, technical, and administrative fields; but it would have serious disadvantages in disciplines where the value lies less in the results of research than in the research itself, in the contact with the sources, with the originals, as in history, in literature, and in most of the humanities. In such fields the tendency to industrialize intellectual work in order to facilitate it can only result in reducing it to a lower level.

Having thus indicated the three points at which libraries and documentation are most clearly distinct, it is proper to offset them by other points at which the two meet and combine, sometimes to the point of identity. (p. 189)

Many libraries, more or less general in scope, which are by no means centers of documentation, none the less do offer a like service in this or that particular field, even to the selection from periodicals, for example, of everything relating to the history of the locality or the region. Numerous also are the libraries whose erudite personnel have anticipated the "documentalists" by producing for their readers not merely the desired book but the required information. Many American public libraries . . . provide in their reference departments a certain number of reading-rooms . . . [which] with their special collections and their detailed subject catalogs, constitute ever so many centers of documentation. This extent is such that one may explain American indifference to the documentation movement thus far by the fact that documentation is already organized there in the public libraries, which, inspired by an entirely practical "spirit of service," have always tried to answer all the clients' questions (information desk, readers' advisory service, etc.). (pp. 189-190)

Moreover, what about the many special libraries, in Europe as in America, . . ? What are they if not mainly centers of documentation which, without being so called, have for a long time had the essential characteristics of such centers: a specialized personnel extracting the gist of periodicals, etc.? (p. 190)

Koblitz, 1969:

> [The] term "documentation" includes in its real meaning only a special method of document handling, viz. the exposition of its contents.
>
> . . . .
>
> So, instead of "documentation and information", it would be more reasonable to use a more appropriate in sense and more logical term "documentalistic information". (p. 130)
>
> . . . .
>
> The basic feature of information and documentation is the use of specific methods for revealing and processing specialized information by selecting, in accordance with the request, and exposing the contents of relevant sources of information, and disseminating the information thus revealed in the analytic and synthetic form.
>
> The selection and exposition of the contents (abstracting and other forms of revealing information) as well as recording of important special information and its indexing constitute documentation. (p. 131)
>
> . . . .
>
> The librarianship is concerned with the processing of primary information (sources of information) through reflecting it in catalogues and bibliographies. The main forms of processing consist in recording bibliographical descriptions, indexing and sometimes in annotating the sources of information.
>
> . . . .
>
> Information and documentation analytically process primary information (sources of information), which constitutes one of the distinctions. Putting it in other words, information and documentation expose the contents in essence (documentalistically), i.e. they determine the degree of novelty of information contained in these sources. (p. 132)
>
> . . . .
>
> To put it differently, the compiling of a bibliography of bibliographies, bibliography of abstract journals, etc. is the task of libraries and the compiling of review abstracts, reports on the latest achievements in a particular field and subject surveys is the task of information and documentation. (pp. 133-134)
>
> . . . .
>
> Processing (synthesis of the contents) of a number of information materials, i.e. preparation of surveys, reports on latest achievements and carrying out of subject studies, is the task of information and documentation. (p. 139)

Foskett, 1974:

> Librarians, traditionally, have been called upon to supply known documents, and such requests have been stated in terms of what was constant about a known document: its author. Libraries have also traditionally covered a large part of the field of knowledge, and their librarians have made it a point of professional pride that they tried to collect everything of value.

. . . .
They were expected to be scholars, but not specialists in the same sense as information officers, that is in direct relation to the interests of their users, since these latter were usually large bodies of non-specialists, or of specialists whose specialities were not particularly related to the library.
. . . .
Pre-eminently perhaps, librarians needed to be expert in the art and science of book production, or bibliography in all its technical aspects.
. . . .
The change that has come over the practice of librarianship has been due to more or less the same factors that produced the phenomenon of the information scientist himself: the vast increase in the amount of research and publication that has occurred this century. . . . Whether they liked it or not, librarians have been forced to meet this situation, and they have done so by the same methods as information scientists; that is, they have brought their traditional methods up-to-date, and introduced new ones such as automatic storage and retrieval systems. (p. 12)

Intellectually, the principal change has perhaps been the switch from the author request to the subject request. For many research documents, the author is no longer the same constant and easily identifiable factor as for the traditional type of book. (pp. 12-13)
. . . .
My own analysis of the original situation is this: when specialists first came to realise that there had arisen a social need for the analysis and dissemination of information to those who could use it, they tended to see this as a fundamentally distinct role from that of the librarian, who was then still regarded as a custodian of his books. . . . It was thought to be a role that only a subject specialist could play, and librarians were not subject specialists. It was true that librarianship seemed to be related: documents had to be collected, classified, indexed, displayed. But the basic requirement of subject knowledge seemed to indicate that the new role was a substantive one, and not a secondary branch of the existing profession. (p. 13)

Comments

Subject analysis was taken in this set of conjunctional definitions to be, at various times, a differentiating function in the domains under discussion and, at other times, an integrating or unifying function.

Some misconceptions were also identified in the literature.

Koblitz (1969), for instance, argued that content exposition signified 'the determination of the novelty of information in a source', but it is patent that this describes the functioning of researchers and critics. It is not the functional equivalence of subject analysis.

Although the analysis of domain objects in order to describe and index them is part of the domain or domains under consideration in the present inquiry, this focus ignores the functioning of users, and so does not adequately represent the social dimension involved.

7.11. Conjunctional Definitions about Objects and People: To evaluate

This set of definitions is illustrated by the following literature.

Shera, 1965a:

> The communication process is a duality of system and message, of that which is transmitted as well as the manner of its transmission. Therefore, the librarian must see his role in the communication process as being more than a link in a chain; he must also concern himself with the knowledge he communicates, and the importance of that knowledge both to the individual and to society. Yet the study of the nature of knowledge, and the relationship between the structure of knowledge as it has developed in contemporary Western civilization and the librarian's tools for intellectual access to that knowledge, have received almost no attention and certainly no real exploration. (pp. 7-8)

Harlow, 1969:

> Applying the concepts suggested by physics, the "field" of librarianship could then be tentatively described as embracing the whole range of existing knowledge and information, embedded in a larger field of action involving the production of new knowledge, learning, decision making, etc. The <u>structure</u> of the field is the <u>process of communication</u>--generating, organizing, and storing information, establishing the interface between the

information field and user, retrieving, analyzing, and validating information, transferring it to the user, and obtaining feedback.

. . . .

It is not the objective of this paper to develop a valid general theory of librarianship but to argue the necessity of taking a unified approach to the field in respect both to its scope and activity. Although librarianship is a process (and a part of other processes), most teachers and librarians seem to see it otherwise: viewing "the library" as an agency separated from other agencies; seeing the field fragmented into "information science" and "library science," into "type-of-library" and "type-of-activity," processing and public service, acquisitions, cataloging, reference, and administration. (p. 205)

. . . .

Working with information and people necessitates taking into account pertinent insights, principles, and constraints which derive from a number of disciplines, among them information science, systems analysis, ... (pp. 206-207)

Halm, 1978:

The information officer came on the scene when special librarians started to call themselves information officer to upgrade their image and in turn hoped to upgrade their salaries too! An information officer evaluates information and became a "new" professional librarian in "a 'new synthesis' of activities outside librarianship--translation, editing, publishing, statistical analysis, commerical research, technical publicity and so on" [Vickery, 1954]. (p. 14)

. . . .

From this study one gets the impression that notably special libraries form a strong force in the unification of these above mentioned functions which are all directed to the mission to bring information to the user and that differences are disappearing as the boundaries between the various types of libraries diminish. Librarians, documentalists, information officers, information scientists, etc. do need each other. (p. 15)

. . . .

As noted earlier, it is not our objective here to attempt to "set the world aright" regarding the proper name for those who deal with specialized information services. It is hoped, however, that the animosities and exclusiveness that we have noted among these groups of information professionals will cease, and that all will work together to improve the work that is performed. To that end, we have, in this report, used the terms special library, documentation center, and information analysis center (as well as the term for the workers in each) interchangeably. More accurately, we have attempted to <u>retain</u> the terminology that has been actually <u>used</u> in each country, organization or individual. We believe, however, that the issue is not the term that is used but, instead, the level of the service that is needed by the users. (p. 17)

. . . .

. . . .
[The] basis of librarianship will be found in library and information science, . . . (p. 32)

Comments

The function of evaluation, like the functions of creativity and utilization, is not in the domain or domains of library science and information science. Evaluation is embedded in both creativity and utilization. The validation of information is, notwithstanding Harlow (1969), among others, the responsibility of discoverers and users of information. Foskett (1974) criticized this conflation of functions:

> We continue to stress the importance of the subject approach; but the subject knowledge that we require is of a special kind, namely, the knowledge of the structure of subjects, not the details. . . . Even in one organisation, of course, the information scientist is not a specialist in the same way as those he serves. He is not there to be more expert than the experts; he has to know about many fields, he must be able to talk sensibly to many different experts. Very often, it is precisely his breadth of knowledge that makes him valuable. One can express this in a fundamental way: the information scientist (like the librarian) is not, in his professional capacity, an authority on subjects, but on the documentation of subjects. This means that the task of professional education is not to teach the subjects themselves, but the structure of their systems of documentation. In my view, acceptance of this single factor clears away most of the difficulties in the way of agreement on a common core for the curriculum.
> . . . .
> Outside of the core, there will continue to be a need for options . . . on the literature and librarianship of special subjects . . . for public librarians, children's librarians, rare book librarians, historical bibliographers and archivists. But all of these are occupied with the same kind of function, and all will profit from the same kind of basic course. (p. 13)

Gaudron (1976) also argued that the function of evaluation is conceptually distinct from the function of providing information:

> It could be argued that librarianship is not a profession and there may or may not be some truth in this. Whether

> libraries will survive then becomes important, and it is linked with whether or not the profession will survive or be supplanted by others (including information scientists). The outcome may depend on which group more correctly interprets the relevance and functions of a library and acts swiftly enough to assert such relevance and employ the functions. It was claimed [by others] . . . that one difference (and implied advantage) information scientists have is that the information they deal with is analyzed and commented on before reaching the client. In answer to this it may (and has) been claimed that, in this instance, information scientists become users and not providers of information. Effectively, they are providing new data rather than real information, in which case they revert to being scientists. The closest equivalent of such practitioners that the library profession has would be subject specialists. The encroachment of the information scientists may pose no threat at all. Developments in communication and information practice may make possible a rise in the numbers of these "new" scientists, but until noticeable demarcation in duties occurs and demand grows such incursions will be contained, especially until the data/information definitions are better defined.
>
> . . . .
>
> In the case of libraries, the environment encompasses the sum of all the intellectual activities involved in the experience, decoding and utilization of the human environment. (p. 47)
>
> Whether or not information scientists understand or cope with and utilize this particular environment better than librarians seems to be problematical and may ultimately be irrelevant. Even the productive (i.e., constructive) utilization of its elements may not distinguish the two groups. . . . It is the social value of their respective positions which may decide the issue of survival. (pp. 47-48)

More than twenty years earlier, Vickery (1954) had criticized the notion of evaluation as a distinguishing feature of the new profession of information officer:

Vickery, 1954:

> Two contradictory viewpoints are repeatedly found in pleas . . . for recognition of a new profession, that of information officer. On the one hand this is presented as a "new synthesis" of activities outside librarianship--translation, editing, publishing, statistical analysis, commerical research, technical publicity, and so on. With such a new profession librarians would have no concern, for it would lay "little or no claim to the techniques of librarianship", as Mr. Farradane [1953] observes at one point.
>
> On the other hand, when it comes to specifying the training which an information officer needs, advocates of the new profession lay very considerable claim to library techniques of locating, organizing and disseminating recorded data. . . . [He] must

> evaluate the information. (p. 103)
> . . . .
> What does "evaluation" mean? Firstly, the recognition that certain recorded data lie within a certain subject field known to be of interest to one's clientele, and are therefore potentially of value to that clientele; second, the recognition that the data are actually of value because they are new, soundly observed, and of immediate relevance. . . . (pp. 103-104) [The] first stage requires neither more nor less [subject knowledge] than is already needed for book selection and classification in a particular subject.
> The second stage of evaluation requires more than subject knowledge--it needs an up-to-the-minute understanding of what is currently occupying the minds of one's clientele. It is true that some information officers, fresh from the laboratory bench, can provide such critical evaluation for their close associates. But to do so for a large and varied establishment is impossible, and for a whole industry, such as a research association serves, unthinkable.
> . . . .
> I conclude, therefore, that in so far as the information officer is concerned with locating, organizing and disseminating recorded data, he is using library techniques. These techniques are developing, and to this development many information officers . . . are contributing notably.
> . . . .
> It is in the interests of information officers to remain within the library profession. (p. 104)

Nor can the evaluation of information be taken as conceptually equivalent to the evaluation of information searches, as Schur and Saunders (1968) have implied (Appendix III, Section 7.11.).

Moreover, like the analysis function, evaluation focuses on the objects of the domain, to the exclusion of the functioning of users, and so the role of users is not characterized.

7.12. Conjunctional Definitions about Objects and People: To manage or control

This set of definitions is illustrated by the following.

Shera, 1951a:

> [The] problems of organizing effectively the graphic records of our civilization are almost wholly managerial. . . . 'Bibliographic

organization' is a dualism, and the important half of the bifurcation is organization. Effective organization presupposes managerial competence. (p. 63)

. . . .

If the graphic records of our culture have any meaning for our self-preservation they must be organized for effective utilization. . . . Bibliographic organization--or more precisely, bibliographic management--is the primary responsibility of the professional group which has taken general charge of society's graphic records. Call them librarians, documentalists, information experts, or what one will, all those individuals who are concerned in any way with any part of this task must realize that the undertaking is an indivisible whole that is something more than the sum of all its parts. The corpus bibliographicus is an organic unity that suffers dismemberment only with serious danger to the vitality of the entire organism. (p. 64)

Larson, 1975:

By this paper's definition, any person who acquires, catalogues, preserves, and makes available information for a defined constituency belongs to the information managers' profession. This profession is composed of five separate, distinct subprofessions: librarians, archivists, records managers, audiovisual specialists, and information scientists. (p. 5)

. . . .

The role of the information manager has always involved the same components: the acquisition of information in whatever format it is created in, the intellectual description and arrangement of the information for potential users, the technical preservation of the information format for a set amount of time, and the actual physical delivery of the information to the user.

. . . .

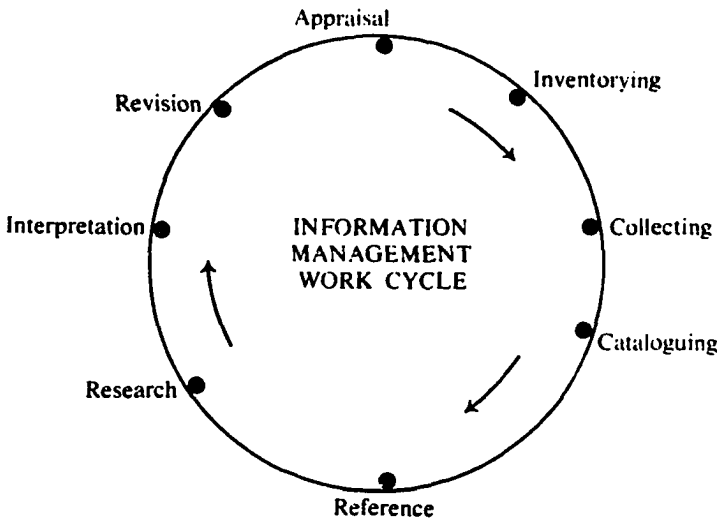
Until the 1930's the library profession was recognized as primarily responsible for the management of information in the North American countries. (p. 3)

. . . .

The information manager has adopted appraisal criteria based on some standard. These appraisal criteria are then applied in inventorying the materials, collecting those to which the criteria apply, cataloguing these materials, and then providing access to them. The information manager therefore has an intellectual role in the continued research and in interpretation of materials, leading to revisions that affect the appraisal; thus the redefinition requires a different inventory, new collecting, new cataloguing, new references. The circle never stops. This work cycle is common to all information managers. (p. 7)

. . . .

Fig. 1 – *Information Management Work Cycle*



(p. 6)

Gardner, 1980:

> Conceptually, then, librarianship is the channel from which most information managers may flow, but it is also an extension of their capabilities to see the broad view of information delivery within their parent organization. It is the integration of skilled librarianship with other disciplines, such as marketing, data processing, word processing, strategic planning, and records management that extends the horizons of information management.
>
> . . . .
>
> I suggest that whether we call ourselves librarians or information managers, it's time we stopped fighting over boundary lines and borders and joined forces to educate top management--whether government, industry, or not-for-profit--to see the real value that information has for the organization.
>
> A librarian who has started thinking about the function the library performs for the parent organization is an information manager. . . . The attitude toward information productivity and the decision-making value of information is the crucial factor in managing this resource, not job titles. (p. 376)
>
> . . . .
>
> While librarians can harness some of the halo effect that information management offers our profession, information managers need to remember that librarianship is the main branch of an emerging profession that still has to prove its worth to many watchful eyes.
>
> . . . .
>
> I choose to remain both a librarian and an information manager. I still enjoy scanning publishers' catalogs. I still want very much to visit other libraries to see how they solve problems we may have or expect to have. At the same time, I want to find out how computer graphics works; how word processing equipment is used within my company; and how marketing information systems have changed over the past five years. (p. 377)

Comments

The terms 'to manage' and 'to control' do not identify a function unique to the domain or domains of library science and information science. Indeed, there is a managerial or administrative dimension to all social practices. Henry (1977), for example, has treated the notion of 'knowledge management' in the following terms:

> By knowledge management, I mean public policy for the production, dissemination, accessibility, and use of information as it applies to public policy formulation. In this sense, knowledge management constitutes what Yehezkel Dror [1968] calls "metapolicy"; that is, policy for policy-making procedures. (p. 176)

Such a conception, bound to public policy-making, is not adequate for characterizing the domain or domains under consideration here.

The emphasis on control as the functioning of the domain is also inadequate, because control of objects must be sorted out from control of users. Moreoever, control of users is an inappropriate objective. Thus, the cybernetic control model suggested by Penland (1971), among others, is logically insufficient to describe human social functioning. The human being is more than a mere 'adaptive control system' as Penland argued (Appendix III, Section 7.11., p. 432); nor can his claim be taken seriously that the human being is 'the sum of systematically collected and empirically measured bits and pieces of scientific evidence' (p. 451). Such cybernetic and robot models of the human being are conceptual distortions which impede the formulation of an adequate understanding of the social domain of interest to the present inquiry.

7.13. Conjunctional Definitions about Objects and People: To mechanize

This relatively minor set of definitions encompasses such terms as 'to computerize', 'to machine process', 'to exploit mechanically', and 'to automate'. Illustrations from the literature follow.

Taube, 1953:

> In this country [the United States] then, the term "documentation" was first used specifically by librarians in connection with microphotography; . . . (p. 10)
>
> In Europe, there was an entirely different usage of the term . . . [as] the organization of information, more especially with developing and disseminating the practice and use of the Universal Decimal classification system. (pp. 10-11)
>
> . . . .
>
> But the publication aspects of the term in recent practice has been extended from microphotography to include the development or utilization of the various near-print processes which are for a large measure based on photography. These new processes, by freeing documentation agencies from dependence upon centralized printing facilities, enable such agencies to become publishers as well as collectors and organizers of information. Further, the decentralization of publishing leads to the decentralization of the dissemination of published materials, and thus the documentation agencies find themselves concerned with developing methods of organization of information which permit more effective dissemination. Hence, it is natural and reasonable to use the term "documentation" to cover this total complex of activities from publishing through dissemination.
>
> Perhaps no single instance better illustrates the coming together of these activities than the publishing of the Library of Congress Catalog in book form. (p. 11)

Taylor, 1967:

> Information science interfaces with the library primarily through the technology. . . . There are five areas where information science and technology interact with librarianship and library education: systems analysis; environmental context; information channels; the naming, labelling, or classification process; and the man-system interface.
>
> . . . .
>
> [The] intellectual apparatus necessary to support a true library system . . . [and] the technology and systems knowledge required . . . is . . . information science, . . .
>
> . . . .
>
> Librarianship and related professions tend to view the

information sciences as concerned solely with their information-processing activities. This is confusing the application with the science. Information science is not concerned with the development of information-handling systems, but rather with the explication of system and environment. In contrast, information engineering deals with the design of systems for handling messages, both in real time and retrospectively. Both are concerned with the generation, organization, storage, and dissemination of messages, but for different purposes. It is through the technology that the science interfaces with the library. (p. 45)

. . . .

With all of this it is important to remember that the library is but one application of information science. However, if we use a generic concept of librarianship, as encompassing the processing and dissemination of formalized messages, embedded in a larger communication context, librarians will have more freedom of movement and a more effective and realistic pedagogical and academic position.

The profession prefers to think of itself as rooted in a humanistic tradition.

. . . .

[Information science] offers a much broader view of librarianship. (p. 47)

. . . .

In order to direct information science and technology to his interests, the librarian must define his problems in management, resource allocation, decision-making, processing, dissemination, and services. (p. 48)

Kubatova, 1978:

As far as informatics is concerned, two major directions are known to have existed in shaping concepts of this new discipline; one of them was based on organized processing of scientific and technical information, and the other--on social statistics and national economic records (batch data processing). (p. 60)

. . . .

The theory of library science and the theory of bibliography were at first pragmatically perceived systems of rules and assumptions which grew out of immediate practical needs. Later the theory of library science developed on the basis of regarding libraries as social institutions, as well as by studying their organisation and content of their work. Bibliography focused its work on registration, description, systematization and analysis of printed matter, as well as on preparation of listings and indexes facilitating orientation in literature as well as its propaganda and application.

In the late 19th century documentation began to develop within the framework of bibliography; one of its features was that with regard to the user it was custom-made, and stressed the promptitude of providing information (i.e. also technical means of information transfer), as well as provision of non-traditional documents which are important for scientific and technological progress. Documentation paid special attention to the analysis of document content and to the so-called multipurpose approach to

> the storage and retrieval of document descriptions. (p. 61)
> . . . .
> The emergence of concepts of the new specific scientific discipline (here referred to as information science bearing in mind many other names used) dates back to the time when the theory of classical documentation systems interlinked with book science, the theory of library science and the theory of bibliography, was in itself inadequate for design and implementation of computer-based information-retrieval systems with their complex social linkages (at the turn of the 1960s). . . . We believe that an important feature of development is the fact that the main stimulus for the emergence and development of concepts of the new scientific discipline was provided by the rapid growth of scientific and technical knowledge after World War II, its growing importance for mastering and managing social processes of all types, as well as the exclusive sophistication of machine processing of texts (predominantly of verbal forms of information). (p. 62)

Comments

This set of definitions ignores the functioning of the user, and so is not adequate for characterizing the whole domain. Moreoever, the introduction of new technology does not alter the nature of functions which constitute social practices. Thus, microphotographic technology in the 1930's did not, as Taube (1953), among others, mistakenly believed, usher in a new domain of documentation as 'publishing'; nor is there any rationale for describing automated libraries as 'information science'. Technology is part of the means to realizing objectives; in the case of the computer, it represents an alternative setting to the artifact-centered library building for the functioning of the domain. Saracevic (1977) has criticized the technology focus:

> Information science itself and information science education had basically the following two premises: 1) the information problem lies with the information explosion, and that 2) the solution to the problem lies in the application of technology. It is questionable whether these premises are correct, but we are still living with them and are often governed by them. There is also another notion involved, and that is that there is a <u>scientific</u> dimension to the

study of the problem and to the study of the solution.

Historically, the first courses, as far as I have been able to find out from the history of information science education, were offered, I believe, in 1955 by James W. Perry and Allen Kent on machine literature searching. (p. 27)

. . . .

We have come to realize that in the field of library science, as well as in information science, computer science, etc., you cannot build a science--you can only build a profession on the basis of machinery or an institution. As long as computer science is being built on the basis of a machine, there can be no computer science; as long as library science is being built around the library as an institution, there needs to be a science underlying library science; as long as information science is being built on the basis of information retrieval systems, there can be no information science.

. . . .

[My] projection is that library science and information science are converging in practice in two major respects: 1) theoretical concerns and 2) practical applications.

. . . .

In information science, we see in many cases that professional services are integrating with libraries....We also see in information science the development of an "information industry." . . . We have also seen that research in information science is shifting from the examination of internal process of information retrieval systems to the examination of underlying processes, e.g., the structure and dynamics of literatures. (p. 34)

8. Conjunctional Definitions about Kind of Domain

The definitions in the literature of library science and information science which focus on the nature and scope of the domain or domains attempt to characterize its philosophical and/or its sociological dimensions. The most frequent emphases relate to: 1) institutional setting; 2) the study-practice and science-profession dichotomies; 3) innovative-traditional and science-humanism dichotomies; and; 4) the nature of the domain content. In some cases, the objective is to differentiate between domains, while in others, it is to demonstrate domain unity. Moreover, combinations of the above-mentioned emphases were frequently treated as if they

represented single concepts.

8.1. Institutional Setting

The following definitions from the literature illustrate the emphasis on institutional setting as the characterizing feature of the domain or domains:

Taylor, 1963:

> [The] scientific community has developed many means to circumvent the library in order to obtain the information it needs and wants. The information sciences explore this entire matrix of specialized communication, both formal and informal, in order to understand and to develop means of making knowledge available. (p. 4162)
> . . . .
> [The] concern of the information sciences is to understand and to improve the total complex of scientific communication, ... (p. 4163)

Artandi, 1972:

> [In] information science we are often concerned with problems that are qualitatively the same as library problems at the same level, except that we are considering these with more sophistication in order to cope with and utilize changes which have occurred in the environment in which we now need to operate. (pp. 16-17)

Faradane, 1972:

> The need to define information science became apparent after protracted earlier discussions . . . in attempts to establish the field. Persons had increasingly been employed, since about 1922, but especially after 1948, in posts for the provision and organization of information. Various job titles were used (information officer, intelligence officer, etc.), and this led to confusion both as regards personnel and the possible scope of the work. Those undertaking the work were mainly scientists who saw their work as a specialization in research, dealing with the literature and undertaking tasks from abstracting and searching the literature to, eventually, computerized information storage and retrieval. To the persons so employed it was clearly different from librarianship, even though employers in industry, lacking an adequate appreciation of the possibilities of the work, often confused it with librarianship and expected one man to undertake both. (p. 673)
> . . . .

It must be pointed out that this name for the field [information science] has, in Great Britain, remained in definition as covering both the practical work involved and such theoretical aspects as have been developed. (In the United States, the name "information technologist" or "information specialist" is applied to the person undertaking the practical tasks of an information service, and "information science" is applied to the purely theoretical field.) Education in Great Britain therefore covers the whole range. It must also be noted that, now information activities are spreading to fields other than those of the sciences and engineering, such as economics, legal requirements, and the social sciences, the term "information scientist" must be taken as one concerned with the science of information. (pp. 673-674)

The Institute [of Information Scientists] did define information work as "the collection, collation, evaluation, and organized dissemination of scientific and technical information". If by "technical" there is to be understood any field having established techniques, then the definition will still be adequate. The definition does, however, make clear the essential difference between information science and librarianship, in that information science is primarily concerned with the organization of information, and not of the sources of information; information scientists use libraries (and any other sources of information), but do not organize them. (p. 674)

Gaudron, 1976:

Libraries seem to be, paradoxically, environments and non-environments simultaneously, because they are at once repositories and clearing houses. But in fact they exist to assist in the synthesis of new knowledge by collecting centrally the diverse and unrelated (although all knowledge is finally related) elements which eventually form new disciplines. The danger to their existence lies only in whether they stagnate by reversion to being just repositories. The old concept of the librarian as custodian must be finally subordinated. (p. 48)

Saracevic, 1979:

Information science has emerged in the context of the newer "communication fields" and not as an expression and metamorphosis of librarianship or documentation. The historic record bears this out. In a large majority, the founders of information science were not librarians or documentalists, nor were their original approaches derived in a direct way from librarianship or documentation. In particular, documentation . . . was much more of an international movement than a discipline. . . .

In relation to librarianship, information science concentrated on different aspects of the communication and literature problems: Librarianship more on the sources end of communication and the organization and preservation of literature and information science more on the destinations end of communication and on the retrieval from and dissemination of literature. Thus their relation is a natural one through the underlying phenomena and processes, as well as through the reliance on each other's systems. They are not

competitors for the same ground. Many fields, while addressing the same phenomenon, addressed different aspects of the phenomenon (e.g. biology and medicine); consequently, they can sustain one another--knowledge created in one is usable in the other. This kind of relationship exists between librarianship and information science. However, two other things should be realized. First, librarianship has not really succeeded in developing a theoretical base and a scientific component, nor does it have a tradition of theoretical/ experimental inquiries, while information science from the outset is trying to do so, admittedly with limited success. Thus, some of the information science work may have relevance as a theoretical base for some aspects of librarianship. Second, information science is not at all exclusively oriented toward the "library problem", it has orientations other than "library orientation" and components that are closely related to work in fields other than librarianship. (pp. 7-8)

Tague, 1979:

> Perhaps the safest statement that can be made about the relationship of library and information science is that they are over-lapping but not co-extensive disciplines. The former is concerned with all aspects of library operation and practice; the latter with the characteristics of public information and the behavior of its users. The boundary between the two is difficult to fix. (p. 90)

Buckland (1977) has criticized the attempt to differentiate domains on the basis of institutional setting:

> It is not a new observation that the term [information science] has been used carelessly in library schools and it has often saddened me that very often some pioneers . . . suffered from deans and administrators who had the habit of behaving as though information science included every combination of "information," "science," and "engineering." This meant that the pioneers would be liable to teach courses on the bibliography of science, on the use of computers in libraries, the operation of science information centers, and scientific management as applied to libraries. This indiscriminate use of the term information science persists. Even now, an operations research specialist whose interest is in library problems, is likely to be called an information scientist.
>
> The situation has been exacerbated by a very simple human problem: it is not clear what one should call somebody with an expert interest in libraries who is not a librarain. Of course, during the 1950s and the 1960s, back in the days when science was fashionable it seemed only natural to call him or her an information "scientist." This appeared to some as being more dignified and therefore superior to "librarian." The result of this combination of status-seeking and the "if it's not traditional librarianship it must be information science" has not helped the development of a coherent well-reasoned terminology or image in our field. It was someone who liked to infer definitions from observation rather than first principles who came up with my favorite definition of

> information science: "Information science comprises those topics taught in library schools that were not in the curriculum of the Graduate Library School in Chicago in 1950." (p. 15)
> . . . .
> There persists a widespread assumption that "data processing applied to libraries" and "information science" are largely synonymous. . . . I had thought that the phlogiston theory of converting base metals into gold was a fantasy until it occurred to me that systems analysis when applied in other contexts is business administration, but systems analysis applied to libraries mysteriously becomes information science. (p. 16)

8.2. Study-Practice and Science-Profession Dichotomies

Many of the conjunctional definitions have argued that a study-practice or science-profession dichotomy can be discerned. Thus, one domain is said to constitute, variously, a science, a metascience, research, the research and development undertakings, a theoretical discipline, the scientific foundation, a study, a body of theory, the intellectual and theoretical base, the quantitative techniques, the rationalization, a field of inquiry, a branch of knowledge, or the philosophical synthesis, while another domain, or subset, is then said to constitute, variously, a profession, a practice, a body of codified practice, a service, the applied component, the applied effort, an application, an operation, a technology, a social activity, a service community, or the vocational. Varying conceptions of these dichotomies are illustrated below:

Egan and Shera, 1952:

> The sociologists, though they have directed their attention toward the behavior of men in groups, have emphasized basic emotional drives and motivations and have paid scant heed to the intellectual forces shaping social structures. . . . One is forced to conclude, then, that a new discipline must be created that will provide a framework for the effective investigation of the whole complex problem of the intellectual processes of society. . . .

> Such a discipline is here denominated, for want of a more accurately descriptive term, 'social epistemology', by which is meant the study of those processes by which society as a whole seeks to achieve a perceptive or understanding relation to the total environment--physical, psychological, and intellectual. The derivation of the term is readily apparent. Epistemology is the theory or science of the methods and foundations of knowledge, especially with reference to the limits and validity of knowledge; and through it the philosopher seeks an understanding of how the individual achieves a perceptual or knowing relationship to his environment. Social epistemology merely lifts the discipline from the intellectual life of the individual to that of the society, nation, or culture. (p. 27)
>
> . . . .
>
> [By] co-ordinating the differing knowledge of many individuals, the society as a whole may transcend the knowledge of the individual.
>
> . . . .
>
> [Social] action, reflecting integrated intellectual action, transcends individual action. (p. 28)
>
> . . . .
>
> Yet, despite its complexity and its obvious inefficiency, it is upon this very system of secondary communication that mankind is dependent for intelligent social action in units larger than the individual, and today corporate rather than individual action is increasingly the vital determinant force in the shaping of contemporary society. Thus the focus of attention for the new area of study here described as social epistemology is the analysis of the production, distribution, and utilization of intellectual products in much the same fashion as that in which the production, distribution, and utilization of material products have long been investigated. Graphic communication provides objective evidence of the process. (p. 29)
>
> . . . .
>
> In the development of the theoretical framework of this new discipline and in the improvement of methods of analysis and measurement the librarian and bibliographer should be a pioneer; the operating library, the bibliographic or documentation center, and the bibliographic service the laboratory; and the schools for advanced study in librarianship the focuses of research. (pp. 29-30)

Booth and Wadsworth, 1960:

> Whatever documentation is assumed to be it must be considered in relation to research librarianship. It is our belief that documentation is less a field within librarianship or separated from librarianship than an attitude towards research librarianship. It is an attitude spawned from the conflicts of public, academic, and special libraries; it is a deliberate effort to break away from the stereotyped image of the librarian. (p. 219)
>
> . . . .
>
> Documentation is an attitude that must be shared by all persons concerned with recorded information at the level of mature scholarship. (p. 220)

. . . .

Documentation is regarded primarily as a scientific attitude toward the materials, processes, and services of research librarianship. (p. 241)

Borko, 1968:

Librarianship and documentation are applied aspects of information science. (p. 3)

. . . .

What is information science? It is an interdisciplinary science that investigates the properties and behavior of information, the forces that govern the flow and use of information, and the techniques, both manual and mechanical, of processing information for optimal storage, retrieval, and dissemination.

What then is documentation? Documentation is one of many applied components of information science. Documentation is concerned with acquiring, storing, retrieving, and disseminating recorded documentary information, primarily in the form of report and journal literature. Because of the nature of the collection and the user's requirements, documentation has tended to emphasize the use of data processing equipment, reprography and microforms as techniques of information handling. (p. 5)

Giuliano, 1969:

It is suggested that rather than associating the profession [of librarianship] with the institution of the library, that it define its function as that of knowledge transfer.

. . . .

The main thesis I wish to propose is that the relationship between information science and librarianship is that between a science on the one hand, and a profession on the other. It is like the relationship of medical science to practicing medicine. (p. 344)

. . . .

Information science comprises the set of research and development undertakings necessary to support the profession of librarianship. Just as a medical scientist need not be a medical practitioner, an information scientist need not be a librarian. (p. 345)

Belzer and Brown, 1973:

[There] isn't a single, unified field. Rather, there are numerous fields and areas of study involved in library and information science including (1) the nature of information, 2) information technology, and 3) information services. (p. 18)

Shera, 1973:

The new discipline that is here envisaged we have called, for

> want of a better term, social epistemology, or social cognition, which should provide a framework for the investigation of the entire complex problem of the nature of the intellectual process in society--a study of the ways in which society as a whole achieves a perceptive and understanding relationship to its environment. It should lift the study of the intellectual life from that of the scrutiny of the individual to an inquiry into the means by which a society, nation, or culture achieves an understanding of the totality of stimuli that act upon it. The focus of this new discipline should be upon the production, flow, integration, and consumption of all forms of communicated thought throughout the entire social fabric. (p. 96)
>
> . . . .
>
> Few will deny, we believe, that the human use of the graphic records of society is a scientifically based study to which all branches of human knowledge can contribute.
>
> . . . .
>
> The study of social epistemology, which is in reality the study of social cognition, is the proper foundation of a science of librarianship. As a study . . . it must always focus upon these processes by which society achieves a state of knowing and communicates its knowledge throughout its constituent parts. The librarian's responsibility is the efficient and effective management of the transcript, the graphic record of all that society knows and has recorded about itself and its world. The domain of the library includes what the social organism has learned, its values as well as its facts, its imagery as well as its reality; . . . (p. 97)
>
> . . . .
>
> A reasonable consensus has been reached that information science is an area of research that explores communication phenomena and the properties of communication systems . . . to achieve an understanding of the properties, behavior, and flow of information. (p. 98)

Reynolds and Daniel, 1974:

> Rival groups within the field of librarianship calling themselves documentalists and information scientists have arisen in response to a differentiated concern for various target groups of users, such as the scientist, the technologist, the student, the professional, etc.
>
> . . . .
>
> The two fields--the research field of information science and the service field of librarianship--overlap in a number of other areas also such as in the study of the social context of information-providing agencies, the communication channels for transmitting information, the bibliographic organization of knowledge, and the interface between the user and the system. (p. 4)

Brace, 1975:

> [Information science dissertations] were identified as such or . . . utilized mathematical and quantitative techniques more common to information scientists than to librarians. (p. 20)

Shera, 1976:

> [Information science] deals with the behavior of information in all its forms. Information science, unlike librarianship, is not a codified body of practice, but a field of inquiry, drawing to itself the work of many disciplines: mathematics, linguistics, communication theory, anthropology, and even some aspects of medicine and psychology. Its findings are of great importance to librarians, and it can well lay the intellectual foundations of a future theory of librarianship with its findings eventually absorbed into library practice. (p. 40)

Tague, 1979:

> In this article, information science is defined in terms of its use. It is clear, if one looks at the use . . . that information science has at least these four aspects: the application of new technology, especially computers, telecommunications, and nonprint media, to information processing; the application of analytic and quantitative techniques to the development and evaluation of systems and insitutions involved with information; principles and systems for the control and organization of information--indexing, abstracting, classification, cataloging; a scientific--i.e., research-based--search for generalizations and laws about information and its use. (p. 90)
>
> . . . .
>
> An analytical and quantitative approach to problem-solving, evaluation, and theory building has, in recent years, become a distinguishing characteristic of information science. To some extent, it may be replacing automation as the primary concern of the discipline. (p. 93)
>
> . . . .
>
> There is a danger, if information science becomes too integrated with library science, that its essential nature--analytical, technological, quantitative, research-based--will become diluted.
>
> . . . .
>
> The emergence of information science as an academic discipline may force a separation of research programs from professional schools. Information science may be absorbed by computer science, or business, although it is clear that these disciplines have only a limited relationship with information, as it has been defined in this paper. Or information science may disappear, become a historical curiosity.
>
> . . . .
>
> One hopes that the graduate library programs will see information science as a challenge to a new role, a truly academic role, rather than something simply to be absorbed and integrated into the present curriculum. (p. 96)

The conceptual weakness in the above definitions is the conflation of philosophical and sociological dimensions of the domain or domains under consideration. Cognitive status is being compared and contrasted with social status. In fact, however, each domain possesses

both a cognitive dimension and a social dimension. A science, for example, is advanced by its community of human inquirers, and their social activity as scientists constitutes the profession of science. Buckland (1977) has commented on the problem of confusing these two dimensions in a domain:

> I have come to believe that the semantics of our field is a more serious matter than is generally acknowledged. It is all very well for people to say that the theoretical--if not scientific--foundations of librarianship is information science. I am inclined to be tolerant of that statement, though not to the assertion that information science is the research component of librarianship. However, let us reflect a little on what that says to the world. It implies that the theoretical, if not scientific foundation of librarianship is not librarianship. (p. 15)

Malan (1971) expressed similar objections:

> If it is true that library science has thus far developed philosophically and empirically, without a scientific basis and that the results of information research give the librarian the nucleus for a scientific basis, but the problems of the library profession are passed on by librarians to other researchers, then we are giving with one hand and taking with the other, for how can the scientific basis of the library profession be relinquished to other researchers without acknowledging one's own incompetence. The provision of information has, in my opinion, always been one of the scientific bases of library science, but one on which librarians were unable to do thorough research through a lack of means. Attempts have been made, but they have mainly been based on the research methods used in the humanities. Since the physicist and the technologist have refined their research methods, we must advance with them and seek for answers and solutions in their fields as well, without neglecting the social and human sciences fields. (p. 253)

The conceptual distinction between the cognitive, or philosophical, and the social, or professional, dimensions of a domain has been clearly elucidated by a number of philosophers and historians of science. Among them, Kuhn (1965) noted the need to treat of "the community structure of science" in historical explanations of scientific development:

> The analytic unit would be the practitioners of a given specialty, men bounded together by common elements in their education and apprenticeship, aware of each other's work, and characterized by the relative fullness of their professional communication and the relative unanimity of their professional judgment. In the mature sciences the members of such communities would ordinarily see themselves and be seen by others as the men exclusively responsible for a given subject matter and a given set of goals, including the training of their successors.
> . . . .
> Groups like these should, I suggest, be regarded as the units which produce scientific knowledge. (p. 253)

Similarly, Toulmin (1972) delineated the twin features of any rational enterprise: disciplinary status and professional status. A rational enterprise comprises both a changing population of conceptual problems and a changing population of problem-solvers. He argued that:

> [The] conceptual genealogy of an intellectual discipline has to be embodied in the human genealogy of a scholarly or scientific profession, . . . (p. 218)

A profession, Toulmin wrote, is the institutional embodiment of the intellectual discipline, the "socially structured human agency by whose activities it is carried forward" (pp. 262-263).

Thus, a domain is a duality of discipline and community, of intellectual concepts, problems, and goals together with the profession of inquiring scholars, the knowledge-seekers, who formulate and extend those concepts, problems, and goals.

With respect to a domain of social practice, then, theory and theoreticians are an integral element of the domain, not a separate domain marked off from practice and practitioners. In a social domain, manifestations of practice are the substance of theoretical inquiry. Buckland (1977) has observed the necessary link between theory and practice:

> Theory of any kind is necessarily a sterile activity unless

> at some point it is related to and tested against reality. In other words, theory must be related to something. Economic theory must be related sooner or later to an economic system and to economic data. Even logic is theory about theory. It follows from this that information science must do more than be a theoretical activity. It must relate in some way to activity involving access to information. (p. 16)

Earlier, in a somewhat similar vein, Rees (1965) had argued that:

> The heterogeneous origins of the researchers and teachers of information science are at once both a cause and product of the lack of definition of the field. The numerous attempts to define information science have reflected essentially parochial viewpoints. It is not surprising that researchers have endeavored to crystallize information science around their own discipline(s). In this manner it is assumed that information science is librarianship in greater depth, linguistics writ large, and so on. The temptation to pour information science into the mold of one's own expertise and competence is difficult to avoid. Information science exists in the eyes of the many beholders.
>
> . . . .
>
> I would suggest that the arguments concerning the nature of information science are occasioned by the confounding of service functions with an academic discipline. This distinction is implicit in the notion of science information versus information science. The attempts by a heterogeneous group of individuals to apply the research methodologies of mathematics, linguistics, or psychology to the investigation of the phenomena involved in the transfer of meaning from one mind to another cannot transform ipso facto a collection of research methods into an academic discipline. Nor can the empirical practices of those engaged in providing information services be adequately formalized at present by the theoretical models of researchers divorced from practice. The contribution of information-science research to the practice of information handling has been negligible. Can we not agree that, at the present time, information science has little connection with information handling and that to use information science interchangeably with information retrieval, science information, or documentation leads only to confusion? (p. 72)
>
> . . . .
>
> The distinctions made between science librarian, science information specialist, information scientist, and information science engineer represent a beginning in the direction of . . . [functional] differentiation. However, I am not convinced that such a categorization is adequate.
>
> . . . .
>
> [We] do not know, at this juncture, how librarianship is related to the broader concept of communication involving non-written as well as written communication; we recognize that librarianship is not scientific and has no true research methodology of its own, and must therefore be interdisciplinary. (p. 73)
>
> . . . .

> In the absence of agreement as to what constitutes information science and in view of the conflicting requirements involved in the training of researchers and practitioners, teaching must necessarily be subjective and highly artistic. (p. 75)

Taylor (1973) held that:

> My first assumption says that there is a broader geography of interests within which libraries and library science are but a small corner--and that we neglect this larger context at our peril. These other interests bear a whole spectrum of labels: information science, instructional technology, communications, computer science, management, media, telecommunications, policy research, etc., etc. Librarians have cut themselves off from this larger more dynamic world, because of their excessive concern with the "how" rather than the "why" or the "what". (p. 59)
> . . . .
> [There] is a spectrum of concerns, ranging at one end with information services (such as, but not exclusively libraries) through information engineering, to information sciences. . . . The important point is that they are all part of one body. Above all, I think we do our students a disservice if we let them think the only place they can work and make a significant contribution is in a building called a library. (p. 60)

Roberts (1976) wrote:

> All the social sciences draw the necessary distinction between theory and practice without conceding the need to reserve the title 'science' for their 'fundamental', theoretical interests. There seems no good reason why a social discipline such as information science should be any different. From this viewpoint it is possible to appreciate the essential complementarity of fundamental and practical activities and the particular important of action-explanations in individual terms for purposes of general explanation (e.g. the meaning of events), for direction (e.g. in the design of information systems) and for verification (e.g. testing hypotheses or assessing the effectiveness of systems).
> . . . .
> The complementary activities of theory and practice have only one aim, the improvement of the presentation, transfer and use of information. These ends are practical. It is this practicality that gives to information science its significance and meaning, and gives to theory its purpose. (p. 256)

Poole (1979) also suggested that theory and practice must be related:

> A definition [of information science] is roughly analogous to a rainbow in that it represents a spectrum. This is the case for information science, and its spectrum must locate practice on one end and theoretical research at the other. (p. 8)

Just as educational theory and educational practice, for

example, form the domain of education, so too must theory and practice be logically and conceptually linked in the same disciplinary domain of library science or information science or some conjunction thereof. Theoreticians and practitioners are not in separate domains, or in parent-offspring or set-subset relations.

8.3. Innovative-Traditional and Science-Humanism Dichotomies

The study-practice and science-profession dichotomies were frequently conflated with the innovative-traditional dichotomy or the science-humanism dichotomy in the definitional literature of library science and information science. This differentiation was expressed as a contrast between the innovative, the scientific, the revolutionary, or the non-traditional environment, and the humanistic, historical, classical, traditional, or the conservative. Illustrations of these characterizations are quoted below:

Swanson, 1964:

> The fields of information science, information technology, information retrieval, and documentation will not be treated as separate topics but rather as an integral part of library science, . . . Thus we shall not be concerned with whether information science is part of library science or vice versa, . . . (pp. 1-2)
> . . . .
> Whether librarians should be essentially literate scholars with a pervasive knowledge of books, or "numerate" information technologists with good understanding of computing machines can be expected to typify the issues that arise [in this conference]. (p. 5)

Kent, 1966:

> "Mechanized" information-retrieval systems are those that are characterized by some device, manipulative technique, recording medium, or other nonconventional feature that distinguishes them from the traditional tools of the library. (p. 23)
> . . . .

> "Retrieval," as used in the phrase "mechanized information retrieval," has come to mean more than the standard dictionary denotation, i.e., looking through or exploring thoroughly in order to find something. Today any mechanized processing of recorded knowledge has been considered, for better or for worse, to be "mechanized information retrieval." The processing may merely speed accession, or it may lead to an orderly arrangement of recorded knowledge so as to provide more convenient access by future human users. (pp. 19-20)

Rees and Riccio, 1967a:

> It is unreasonable to suppose that librarianship can remain in splendid, humanistic isolation untouched by the scientific and technological revolution progressing around it. In the same manner that medical practice has been profoundly affected by dramatic developments in biomedical research and computer technology, it is most probable that librarianship will be similarly influenced.
> . . . .
> Much interdisciplinary research has been undertaken involving the behavioral sciences, linguistics, mathematics, and systems engineering in addition to library science. (p. 108)
> . . . .
> At the present time the crucial issue is not whether or not the library schools should teach information science and engineering but rather how they should be taught and by whom--whether as an interdisciplinary venture with other university departments or by a truly interdisciplinary school of librarianship, . . . (p. 114)

Taylor, 1971:

> I, again, see librarianship as rather like the common sections of two overlapping circles, with other circles of varying size coming in from time to time: rather like a Venn diagram gone crazy.
> The two circles are the traditional disciplines of the librarian in history; and the new world of what we must temporarily call information science. The traditional idea of a librarian included many things that most would now reject: that he should know about libraries in general is quite a novel idea for the librarian; he was more expected to be a scholar; to know about bibliography, enumerative and critical, to be a palaeographer, to know about the history of printing and publishing; his languages would be Latin, Greek, French, German, Spanish and Italian, probably in that order; his later successors would know about museum curatorship, and would not be at sea in running an art gallery. He would be a committed humanist, and in recent years his interests would run to local history, to the study of educational theory, the prevalence of reading and its encouragement, and the significance of cultural movements.
> . . . .
> The information scientist, on the other hand, is someone we know much less about, because his pedigree is shorter, and because people with very different definitions are now calling themselves by this name. In terms of the subjects which associate themselves

> in most minds with this label, one would list computer science, programming logic, semantic linguistics, data processing, mathematics, information theory, systems analysis, machine translation (if it ever comes), and a few more intelligible subjects of a more traditional nature, such as statistics, report writing, and even non-traditional methods of subject indexing. (p. 467)

Galvin, 1976:

> The simple fact is that much of what has been traditional in education for librarianship, like much of traditional librarianship itself, genuinely merits both preservation and continued careful nurturing. Such fundamental concepts as that of the social responsibility of the librarian for the preservation, organization, and transmission of the accumulated record of human thought and intellectual achievement, the power of freely accessible information and knowledge to enhance the quality of individual and national life, and the ethical commitment of the information professional to dedicate his skills to the improvement of the human condition, are central to that broad humanistic tradition that is, and will continue to be, the basis for a sound and useful professional education. (p. 273)
>
> . . . .
>
> New graduates and the educators concerned with their placement have been forced by the contracting institutional job market to identify alternative employment settings within which the skills and knowledge of librarianship can be employed. Concurrently, we seem to be witnessing the emergence of a whole range of new "information careers," alternative occupational avenues open to those whose basic professional education is less narrowly vocational in character, and who have the imagination to identify hospitable non-traditional working environments.
>
> . . . .
>
> As a consequence of the emergence of a new and powerful "science of information," characterized by methodological approaches and conceptualizing powers the capability now exists in some schools to redefine the educational mission in wider terms. (p. 275)
>
> . . . .
>
> The growth and development of information science as a field of scholarly investigation also holds enormous promise for the expansion of the empirical knowledge base which must come to undergird librarianship . . . centering on broad, theoretical constructs applicable in a wide variety of information transfer environments.
>
> . . . .
>
> The future of education for librarianship and the related information professions is rich in its potential for a fuller contribution to the improvement of information delivery service. (p. 277)

Palmer, 1976:

> The goals of [information science] . . . are as different from

> those of [librarianship] . . . as are the goals of doctors different from those of hospital administrators.
>
> Because the image of libraries and librarianship attracts applications mostly from women who have undergraduate preparation in the humanities and because the library image draws very few innovative change agents or individuals with scientific backgrounds, information science education should be divorced from the library image that inhibits effective recruitment of promising information scientists. This statement is not intended to detract from the success of library schools in educating large numbers of professionals to fill niches in low-paying, labor-intensive libraries. . . .
>
> Since society is being faced with ever more rapid change, future shock argues for the rapid establishment of information science schools and programs free from the conservative hand of ALA [American Library Association] accreditation, free from the old image of libraries and librarianship, and free from the essentially Nineteenth Century patterns of library organization and management. (p. 12)

Saunders, 1978a:

> [Schur's] Education and Training of Information Specialists for the 1970s [1973] . . . analyses in considerable detail the programmes of leading North American and European schools, sets out a range of recommended programmes and programme components, and gives valuable scope notes in respect of each topic. Its terminology has a scientific and "information" rather than a traditional "librarianship" orientation, but this should prove no obstacle to the normal reader. (p. 22)

The innovative-traditional dichotomy postulated in the conjunctional definitions of library science and information science is logically inadquate as a characterization of the domain or domains of interest in the present inquiry. White (1970) has argued that, although librarianship has been associated historically with the goals and programs of education, culture, and scholarship, the practice of librarianship and information science constitutes a unified domain of technology encompassing both the older associations and information utility for the business community. He observed that:

> Although a great deal of concern and effort has been expended to define just what information science is, particularly how it does or does not relate to librarianship, there has been no real

> agreement among the new information scientists. Some will state quite positively that information science encompasses and includes all aspects of how information is produced, controlled, analyzed, distributed, and retrieved. For these individuals librarianship is an inherent subject of information science, albeit for some a rather pedestrian and uninteresting one. Others attempt to make a distinction between information science and librarianship; they assert that information science is concerned with concepts, theory, experimentation, and development, while librarianship deals with day-to-day practical implementation at the working level.
> . . . .
> Historically, librarianship has associated itself with the goals and programs of education, culture, scholarship, and research, and there can be little doubt that this is still the thrust of our profession. There are value systems which come with this package, and elemental tenets which must be unquestioned.
> . . . .
> And yet, there have been indications that there is indeed another aspect to the profession . . . the orientation . . . of information service . . . aimed at the business community, one which was pragmatic by definition. (p. 550)
> . . . .
> [Librarianship] has been preoccupied with its role in education and scholarship, to the neglect of its responsibilities and concerns with information utility. It is clear to me that the two are no longer separable, if in fact they ever were, and much of the semantic confusion with regard to the relationship of librarianship and information science comes from the suddenly enforced contact. The practice of librarianship and information service is a technology, and like all technologies it is grounded in scientific research, and subject to constant refining. (p. 554)

8.4. Domain Content

In addition to the differentiating elements variously described in the definitional literature in terms of such dichotomies as study-practice, science-profession, theory-service, research-service, innovation-tradition, science-humanism, institutional-non-traditional, the nature of domain object or objects was considered in the literature as a definitional focus. Typical differentiations were between information or knowledge and other classes of messages, materials, communication, or discourse. The following definitions illustrate this

added differentiating element in the literature.

Chandler, 1965:

> It is the social function of libraries to ensure the free flow of information throughout the world to anyone who needs it. (p. 2)
> . . . .
> In the modern world, librarians, documentation officers (including archivists) and information officers are called upon to take a more active part in the dissemination of information and no rigid distinction can be drawn between their specialisms. (p. 3)
> . . . .
> Nevertheless, it is possible to propose a basis for defining the terms librarian, special librarian, documentation officer (including archivisit) and information officer. The information officer's essential task is to impart information, and he should not be called upon mainly to catalogue, classify, index, abstract or translate documents. Similarly, the phrases documentation officer and archivist should only be used when the post is mainly concerned with documents and not with books. In all other cases, the designation librarian or special librarian should be used, even though all libraries house some documents and answer inquiries. (pp. 3-4)
> . . . .
> The distinction between the work of the librarian, the documentation officer and the information officer has drawn its justification from the different degree of subject specialization required in the handling of books, documents and information data. Documents tend to be more specialized than books. Information data, which is indexed manually or is retrievable through electronic machines, is even more specialized. (p. 4)

Asheim, 1968:

> A basic assumption . . . is this: that the library occupation is much broader than that segment of it which is the library profession, . . . (p. 1096)
> . . . .
> Throughout this statement, wherever the term "librarianship" is used, it is meant to be read in its broadest sense as encompassing the relevant concepts of information science and documentation; whever the term "libraries" is used, the current models of media centers, learning centers, educational resources centers, information, documentation, and referral centers are also assumed. (footnote, p. 1096)
> . . . .
> The impact of the new technology and the theories of communication and information science affect every area of library service, even where the machines themselves may never be used directly.
> . . . .
> Whether the application of information science to librarianship is

at the practical level of data handling by computer or at the more advanced level of information transfer, librarians have much to learn but also much to give in return. (p. 1104)

. . . .

Important as bits of information are, there is also need for understanding and knowledge, for recreation and esthetic appreciation, for the development of the individual as a person and not only as a worker or a practitioner. Library education must continue to prepare librarians to serve this need. (p. 1105)

Dolan, 1969:

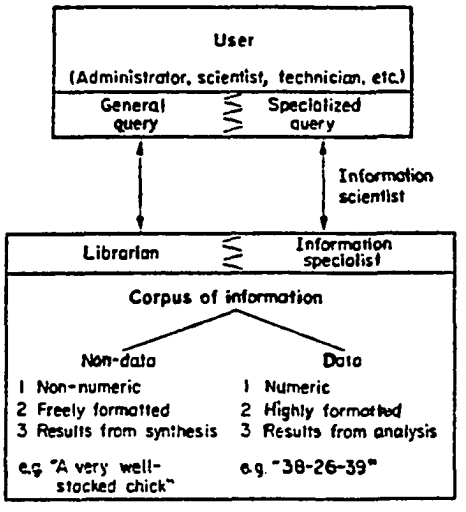


FIG. 2. Nature of interaction between user and corpus of information. (p. 41)

Licklider, 1973:

[Our] field is concerned with human interaction. . . . But we are not concerned with all types of communication. Russel Ackoff suggests three types, distinguished according to purpose: to inform, to instruct, and to motivate (persuade); we might perhaps add a fourth--to amuse (entertain). The first two are both concerned with altering the receiver's concepts, the others with changing his preferences or feelings.

The emerging discipline of information science does not study communication to motivate or amuse, and communicating to instruct (education) is only of marginal interest. Although instructional communication is a closely related field, that may for certain purposes be combined with ours, yet the center of our study is informative communication. Librarianship and documentation have been traditionally concerned with informative communication. . . . However, we know very well that not all information transfer is via records--a great deal of it is personal, face-to-face--and a new science would be unwise to restrict its scope to documentary transfer. (p. 150)

Vickery, 1975:

> What is the content of "information science" (IS)? We cannot point as clearly at this as is possible in the case of L and I services and studies, because the science is still embryonic, and considerable boundary problems have yet to be settled. The informational aspects of any natural phenomenon are as important as its material and energy aspects, and in this wide sense IS is universal in its scope. (p. 155)
>
> . . . .
>
> If we consider only signals received by man, IS is then restricted to the field of human behaviour. If we further consider only signals passing directly or indirectly from one mind to another, IS is then restricted to human communications. If we restrict the meaning still further, to recorded communications, we are directly in the domain of L and I work, but IS in its wider senses can also provide insights of value to us.
>
> In all these senses, IS is concerned with all forms of message within the domain under consideration. A further boundary problem within any aspect of human communication is that we may distinguish messages that 'inform' from those that instruct, persuade, entertain, or have other import--and consequently may wish to restrict IS to the study of 'informative' communication (whereas L and I work is also concerned with instructional, propagandist and recreational documents). (p. 156)

Sergean, 1977:

> The terms of reference of this project required the research team to consider libraries and information units of every main type, . . . (p. 2)
>
> . . . .
>
> One problem for the outsider who is required to work in this field is its lack of definition, ie the absence of precise and generally-agreed boundaries. Which staff are covered? What kind of information is the legitimate concern of the information specialist? What activities may be included under the heading of librarianship and information work?
>
> . . . .
>
> This difficulty in defining the library and information field appears to stem directly from the nature of the commodity handled, namely information. This commodity differs from most others in that it is not, and never can be, the exclusive province of one occupational group, but is the concern of many.
>
> . . . .
>
> The terminology of this field forces one to speak of libraries and information units, librarianship and information work, librarians and information specialists etc. . . . . 'Librarianship and information work' (as practised by the 'librarians' and 'information workers'. . .) is regarded as a single service industry or activity dealing with a common commodity (namely, information) in various forms. . . . This applies whatever the purpose or setting involved. Cultural and recreational material is just as informative

> as advisory or instructional material, if one regards information as the basis for attitudes, decisions and behaviour. Similarly the person who hands a book across a counter is just as much involved in the information business as one who supplies a critical assessment of it. (pp. 7-8)
>
> . . . .
>
> This report is concerned with the 'information business' (whether it be called 'library work' or 'information work' or 'librarianship and information work'). . . . The research team found nothing in the course of this project to suggest the existence of two occupational areas, 'library work' and 'information work', which are quite different in nature. Such boundaries and barriers as exist appeared to be largely artificial. (p. 8)

The effort to distinguish a domain of information science separate from the domain of library science on the basis of the object or objects treated indicates a flawed notion of domain; the dichotomy between 'information' and other kinds of linguistic expression does not provide a sufficient principle for domain differentiation. Moreover, such a distinction is not historically defensible, for some segments of library science have also claimed the notion of 'information' as central to their social practice and their inquiry activity.

9. Summary Evaluation

The conceptual landscape that can be mapped from the definitional literature of library science and information science is dominated by major and minor obstacles to theory building and scholarly consensus. The conjunctional definitions highlight the wide variety of logical fallacies and conceptual weaknesses extant in the literature. Among those identified are the following: the use of a junk class such as 'and others' to encompass unspecified and presumably unknown properties or instances; the presentation of examples of a property or of a class in place of a formal definition stating

necessary and sufficient conditions for class membership; the employment of vague analogies and metaphors in which the precise similarity relation is unspecified; the straw man syndrome in which false dichotomies, usually involving virtue words, provide incomplete characterizations; the adoption of nominal definitions which are merely neologisms taken as self-evident (names without concepts); typographic surrogates such as domain 'X' taken as substitutes for definitions; unconscious defining; implicit defining in which the reader must make contextual inferences. There are also the conceptual errors of 'cybernetic man', environment confused with setting, and setting confused with the content of a domain. Moreover, serious conceptual slippage is noted with respect to the usage of the terms 'information' and 'knowledge'.

There is no consensus in the definitional literature on the usage of domain neologisms. A given domain name can stand for one domain, another domain, a subset of still a third, a domain itself containing subsets of other domains, a subset with yet other subsets of a superordinate domain, or simply an alternate name for some other given domain name. Every conceivable dichotomy and combination of neologisms for the domain or domains has been presented in the definitional literature of library science and information science. The proliferation of domain names, the variations and discrepancies in nomenclature usage, and the incoherent and contradictory notions of domain lead to intellectual confusion and dissensus in the scholarly and practitioner communities. These are names of no fixed conceptual address. Among other critics, Klempner (1969) wrote:

> We need to be cognizant of the fact that there is fractionalization, there is animosity, and there is distrust in our field. Continued exacerbation, continued division can lead only to disaster. The struggle between the science information officer and the librarian in Great Britain resulted in considerable harm to both. Deliberate fractionalization, organization-sponsored animosity between librarians, documentalists, information scientists, information specialists, or to add some new designations, knowledge-transfer professionals, or social-change agents will not promote the advancement of the field of information science.
>
> . . . .
>
> Perhaps we should have done what has been done in the USSR; i.e., adopt the term informatics rather than information science to reflect more adequately the theoretical, applied and social aspects of our field. (p. 342)

Malan (1971) also observed:

> Seldom before in the history of library services, has there been a period of such Babelonian confusion as now exists in connection with the terminology concerning information science. The reason for this confusion lies in the uncertainty about the scope of information science. Objectives, functions and criteria await formulation, and until this is done, the Tower of Babel will continue to collapse over the confusion of terms. (p. 248)
>
> In studying the library literature of the last decade or two, we find ourselves entangled inextricably in a network of terminology which hampers communication. The terms information scientist, information specialist, information officer, documentalist, special librarian, information engineer, subject information specialist and so forth, are used so haphazardly that little can be made of the documents unless the author has defined the terms or appended a glossary. (pp. 248-249)
>
> In England, for example, this worker is usually, but not always, an information officer, on the continent of Europe he is a documentalist and in the United States an information scientist. This confusion in terminology arises mainly from differences in interpretation about the nature of the activities rather than from lack of specific terms. Standardization of terms will be possible only if the functions of the various facets of the subject can be clearly defined. (p. 249)

Similarly, Rosza (1973) argued:

> [As] to the theoretical definition of documentation, it is not less uncertain and vague than that of library science. The variety of designations of information activities--'documentation', 'scientific documentation', 'documentology', 'documentalistics', 'scientific information', 'information science', 'informatology', 'informatics', and the like are all synonyms for one and the same thing which by itself shows a theoretical uncertainty. (p. 58)

In addition to the above obstacles to theory building and consensus, the 445 conjunctional definitions in the literature reveal some seventeen generic functions which have been purported to describe the domain or domains under consideration. In addition, more than eighty-five synonymous, quasi-synonymous, and pseudo-synonymous terms for these functions were identified.

Moreover, many of the generic functions were taken to be conceptual equivalents. Thus, 'bibliographic control' was used synonymously with 'accessibility', 'retrieval', 'transfer', 'handling', 'linking', 'organization', and 'management'. 'Retrieval' was used synonymously with 'reference work', 'mention and delivery', 'communication', and 'handling'. 'Transfer' was used synonymously with 'linking', 'handling', 'control', and 'management'. 'Counselling' was used synonymously with 'linking', 'communication', and 'retrieval'. These conflations were only the more obvious and frequent conceptual substitutions in the definitional literature. By way of illustration of the complexity and slippage of these terms, Vickery (1978) is quoted below:

> Documentation is a practice concerned with all the processes involved in transferring documents from sources to users.
> . . . .
> In the past, documentation has frequently been compared with librarianship, with some argument as to which comprehends the other. The field is more helpfully characterized if we take its scope to be all forms of document (i.e. any physical carriers of symbolic messages) and all aspects of their handling, from production to delivery. The document system then becomes very much wider than conventional librarianship--it includes publication and printing, distribution, some forms of telecommunication, analysis, storage, retrieval and delivery to the user. (p. 279)
> . . . .
> The aim of the [documentation] system should be to link authors (or at any rate their products) to users. As well as giving

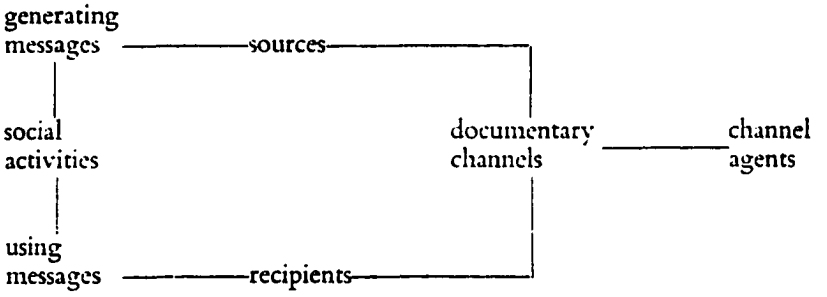
service to all potential users, the documentation system should seek to disseminate all documents.

. . . .

Information transfer is essentially a relationship between people. (p. 280)

. . . .

In a more general fashion we can diagram the information transfer process in the following way:



(p. 281)

. . . .

Instead of 'library' and 'staff' we find 'channel' and 'channel agent' [in the model]. The model further reminds us that there are sources generating messages as well as recipients using them. Lastly, the model is cyclic, and emphasizes that documentary communication is a continuous flow process. (p. 281)

. . . .

Relations between the different elements of the documentation system--publishers, bookstores, libraries, retrieval services--also affect its performance. (p. 286)

Another serious logical inadequacy in the definitional literature is the conflation of the philosophical and the sociological dimensions of the domain or domains. The epistemological character of one domain was frequently contrasted with the professional character of another; this conflation is like comparing apples to the pail used for gathering them.

Thus it is patent that the conceptual landscape of library science and information science is cluttered with logical and conceptual fallacies. Fuzzy theorizing about the universe of discourse has resulted in conceptual obscurity, elaborate argumentation, and ill-tempered disputation with respect to terms. Intellectual confusion has impeded the evolution of concepts and the emergence of scholarly consensus.

Lest it be presumed that this catalog of inadequacies is "only academic", a few instances of real-world manifestations of the ensuing confusions and contradictions are noted below. One of the more dramatic manifestations is evident at the institutional level. According to a compilation by Auld (1980), one out of ten graduate library schools in the U.S. and Canada had adopted the conjunctional term 'library and information...' in their name by 1970, six years after the first such refashioning. By 1980, one out of three had done so; and, at the beginning of 1983, the Association of American Library Schools became the Association of Library and Information Science Education. The trend would appear to be fixed.

At the same time that this trend was emerging, efforts dating from the late 1950s and 1960s to merge the Special Libraries Association (SLA) and the American Society for Information Science (ASIS) were thwarted. White (1976), then president of SLA, noted in retrospect:

> We have not been able to achieve any sort of consensus on the meaning of information, let alone information science. We are fragmented into many organizations, ranging from traditional librarianship to traditional programming, and encompassing several subject disciplines and specializations along the way. My own attempts, along with Joe Becker's, to effect a merger of ASIS [American Society for Information Science] and the Special Libraries Association were not successful. I still believe we were right but enough people to frustrate the proposed union clearly didn't. As a result, we continue as an assortment of many societies. Some interact fairly closely, some are barely aware of each other's existence. Some, like the American Library Association or the American Federation of Information Processing Socieities, claim to speak with a larger voice than represented by their own membership, but none really do. (p. 36)

Another manifestation of the effects of conceptual fragmentation and scholarly dissensus relates to bibliographic control of the literature of library science and information science. This is

nowhere more evident than in the secondary literature. In a comparative analysis of the coverage of six major abstracting and indexing services in 1973, Edwards (1976) reported that:

> The secondary services differ in their views concerning the scope of the field. Thus, they cover different sub-sets of the primary literature, . . . (p. 23)
>
> . . . .
>
> Although variations exist in viewpoint concerning the subject field and in the material covered, there are enough points of contact between the services to show that a single subject discipline might exist with a little effort from workers in the field.
>
> . . . .
>
> It is, of course, possible to hold the opinion that the several services are in existence, apparently health, and to allow the present situation to continue. Perhaps there really are identifiable branches of our field and each service can concentrate on a speciality with a leavening of material from other specialist areas. The present investigator does not hold this view. Enough comparative data are now available from several surveys to show that one word best characterizes our secondary services--they are uneven. . . . All the services demonstrate this uneven approach and it may well be that the user is served worse because of this factor than if he could be certain that some kinds of material were deliberately omitted through declared policy. The user can never be sure that all the literature he requires will be found in a single service. In the author's view, it should not be necessary to subscribe to three or four increasingly expensive services in order to gain access to the literature. (p. 24)

Along the same lines, An (1980) found in her statistical analysis of vocabulary change in information science from 1951 to 1974, as reflected in Information Science Abstracts [ISA] and its predecessors, Documentation Abstracts, American Documentation, and Chemical Literature, that:

> [The] perennial prominence of "information" and "library" indicates the existence of a paradigm in Information Science, involving these two words.
>
> . . . .
>
> The formation of the nucleus by "information", "library", "libraries", and "technical" indicates that Information Science, as defined by ISA, is strongly library oriented. But the editorial notes in ISA have been ignoring this fact. (p. 169)

Thus, the forces of conceptual fragmentation have competed with the forces of conceptual integration. This is apparent in the bibliographic compilation by Davis (1980) of dissertations in library science, said to have been produced by schools of "library and information science" between 1930 and 1980. The classification of the dissertations by domain reveals the pervasive lack of precision and clarity that issues from an inadequate conception of library science and information science. The anomalous sorting of doctoral research into separate domains is illustrated by the following inconsistencies. McDonald's 1979 research, "Interaction between Scientists and the Journal Publishing Process", is categorized in the domain 'information science', while Waldhart's 1973 research, "The Relationship between the Citation of Scientific Literature and the Institutional Affiliation of Engineers" is categorized as in the domain 'library science'. Bearman's 1977 research, "Coverage of Journal Articles by Selected U.S. Disciplinary Science and Technology Abstracting and Indexing Services and Its Relationship to Other Characteristics of the Scientific and Technical Literature, Particularly by Citations", is sorted as 'information science', while Barker's 1966 research, "Characteristics of the Scientific Literature Cited by Chemists of the Soviet Union", is sorted as 'library science'. Byron's 1974 research, "A Comparative Evaluation of Two Indexing Languages", is 'library science', while Conway's 1974 research, 'An Experimental Investigation of the Influence of Several Index Variables on the Usability of Indexes and a Preliminary Study Toward a Cooefficient of Index Usability", is 'information science'.

These anomalous mappings--there are more--demonstrate what

can happen when logically adequate concepts have not been formulated and set forth in the definitional literature. The proliferation of flawed surveys purporting to identify 'information science' courses in graduate library science programs, discussed in Chapter One, is another manifestation of the absence of conceptual rigor with respect to the notions of two separate domains of library science and information science within the universe of discourse under consideration in the present inquiry.

In summary, the conceptual landscape of library science and information science as can be sketched from the scholarly literature is dominated by a number of logical and conceptual chasms: the lack of scholarly inquiry, including the lack of a strong tradition of citing and evaluating previous conceptions, previous definitions in the extant literature; the absence of a striving for universality and international generalizability; the lack of an adequate theoretical, or metatheoretical, framework for guiding the rational human activity of adequately formulating the domain. Definitional claims have not been explicit and demonstrated; to withhold the reasoning from which judgments and conclusions have issued prevents peer evaluation and so conceptual progress is inhibited. Necessary and sufficient features, essential features, must be set forth; accidental features must be ruled out.

What is needed, then, in order to more rapidly advance theorizing is a means of marking off a universe of discourse in which essential components are specified and their functional interrelations are delineated.

CHAPTER FIVE

A LOGICALLY ADEQUATE DEFINITION OF LIBRARY AND INFORMATION SCIENCE

1. Mapping out the Universe of Discourse

The present inquiry has reviewed and evaluated extant definitions of library science and information science and found them wanting. The conceptualizations of library science are inadequate because of their institutional binding, while the conceptualizations of information science are inadequate because of their object binding. Neither a focusing on libraries nor a focusing on information is sufficient. Moreover, the teasing apart of two universes of discourse on this basis is logically flawed, and there is no consensus in the scholarly community on any other principle that would differentiate the one from the other. Indeed, there is no consensus about the proper scope of the universe of discourse, about the proper functionings of the universe of discourse, or about its proper content.

It is patent that the universe of discourse of library and information science is not already neatly defined and awaiting discovery. It does not arrange itself in social reality. It cannot be treated atheoretically as an empirical given. A universe of discourse must be marked off: a system of terms, a definitional network, must be brought to the discourse in order to make sense of it.

Logical and conceptual analytic techniques are required.

The first step is to recognize that the universe of discourse in which we are interested is essentially human and social; it is a social enterprise, as Waples so cogently argued in 1931 in his oft-quoted assertion:

> I take it no one has to argue any longer the fact that librarianship <u>is</u> primarily a social enterprise; . . . (p. 30)

The next step is to describe this enterprise in terms of its practice, that is, in terms of its activity or functioning. Following this descriptive explication, the related components which together make up the universe of practice can be delineated.

Moreover, this universe of practice must be related to one or more other universes of practice or universes of knowledge. There are no valid vacuums in either doing or thinking. Thus, the universe of discourse must be related in some way to exogenous theory or to an exogenous model, so as to provide a standard for rational comparison and judgment.

Then, a set of problems must be formulated, uncertainties about the functioning of the social enterprise, about the components of the social enterprise, or about the interrelations of the components.

This chapter presents one attempt to follow and elaborate the metatheoretical procedure outlined above, guided by the objective of devising a more adequate conceptualization of the social domain which is the focus of interest in the present inquiry.

The present inquiry, then, postulates a universe of discourse that focuses, first, on human social reality, and, then, on the

unique human practice which is the activity of the librarian or the information consultant. Since a human social practice is an organized doing, functions can be specified. As Steiner (1981) expressed it:

> [Human] action is not passive or reactive. Actors take part. There is deliberateness in human action, and so doing is structured, given form and content, in terms of an outcome, a function. Human actions are cognitive. (p. 58)

The function of the librarian (the term 'information consultant' is used interchangeably) which is taken as the fundamental characterizing one in the present inquiry is the process in which someone is trying to bring about access to something for someone who is seeking that access.

This 'accessing function' or 'accessing process' maps out the universe of empirical reality and thus, also, the universe of discourse of library and information science. In addition, since any human social practice involves more than just the description of empirical reality, more than just the scientific dimension is needed in order to adequately characterize the whole universe of discourse. For instance, ethical and social policy realities introduce the philosophical dimension, that is, the study of the intrinsically valuable or of what ought to be, in a given state of affairs. Other realities are involved as well. Means-ends relations must be characterized. Human performances, how-to actions, are also engaged. Moreover, the unfolding of uniqueness within the universe of discourse is possible. These dimensions of the discourse are ways of knowing about states of affairs that issue from ways of inquiring other than from the scientific way. Thus, to properly describe the

discourse, more than science must be characterized. All forms of problems and so all forms of study must be encompassed. The universe of discourse, then, might be more adequately described as a 'study', as the discourse of 'library and information study'; however, for consistency throughout the present work, the term 'science' will continue to be used in this broader sense of 'study'. Distinctions among classes of inquiry problems and modes of research are discussed in more depth in Section 3.2. below.

It may be remarked that, logically and conceptually, other universes of discourse marking off other processes and other states of affairs are of course possible, and glimpses of some of them have been revealed from time to time in previous chapters of the present inquiry; their explication, however, awaits other theoreticians.

2. The Universe of Discourse as a System

In the present inquiry, the primitive notions of guiding and seeking access are taken to constitute a unique social practice and so to mark off the discourse of library and information science. Access facilitation is thus described.

This definitional skeleton, however, must be fleshed out: a logic for proceeding is required, a metatheoretical model which will give meaning and precision to the discourse of practice and study.

This model is sought here from the general domain of system theory, because a social practice can be characterized in system terms. A social practice is a system of human actions and human relations devised to bring about intended social, psychological, and

physical effects. Thus, from the general notion of system theory, a rich network of metatheoretical inferences can be deduced and explicated for the case of accessing taken as a special case of system functioning.

From the known analogy, then, we can give shape to the problematic state of affairs. Analogous theorizing issues from Peirce's (1878, 1896, 1908) conceptualization of 'abduction' or 'retroduction' and from its elaboration and extension by Steiner Maccia and Maccia (1966, 1969) and Steiner (1978). In the first stage of the inquiry process, credible ideas are devised from other credible ideas already extant. Conjecture arises from other conjecture. In retroducing ideas, theory is sought out from other fields as a source for the wanted theory, and the source theory is formed into a model or point of view. Then, content is added to the theory model, ideas are explicated, and the theory is formed. Retroduction originates ideas through the power of adequate analogy.

Minimal criteria for adequate analogizing must be set forth. In the present inquiry, minimal criteria are taken to be that the source theory treats of a human social process as a system, and that an active mediating or intervening agent is admitted together with an active receiving agent. These criteria rule out such theoretical frameworks as the general communication model and the information theory model. The general communication model requires only three elements, source, message, and destination; human mediation or intervention is not taken into account. The information theory model requires seven elements, source, message, transmitter, signal, channel, receiver, and destination; human meaning is not characterized.

Moreover, the general communication model is primarily a model of human oral communication, while the information theory model is primarily one of physical signal transmission.

Cybernetics is also ruled out, or, rather, ruled to be inadequate, for it treats of self-regulation in closed systems, and so ignores dynamic interaction in open systems, for example, the problem of the human being as a goal-seeking organism. Cybernetics is a special case of the theory of general systems (von Bertalanffy, 1968, p. 17).

In the present inquiry, it is argued that general systems theory, as first set forth by von Bertalanffy and then elaborated for educational systems by Steiner and Maccia, meets the minimal criteria specified above for heuristic analogizing. Uses of the theory are considered both within the literatures of library science and information science and from other disciplines in the social domain.

2.1. General Systems Theory

First enunciated in 1945 by Ludwig von Bertalanffy (1968), the theory of systems permits representation of problems of organized complexity in the empirical world. Problems of organized complexity encompass such concepts as wholeness, directiveness, organization, equifinality, teleology, differentiation, centralization, growth in time, closed and open systems, multivariable interaction, in short, "systems of various orders not understandable by investigation of their respective parts in isolation" (von Bertalanffy, 1968, p. 37).

In general systems theory, social and biological entities are

treated as organismic systems rather than as sums of atoms. Organisms cannot return to their original patterns; change is characterized because time is involved. Even though organisms are partly divisible into components, that is, partly mechanized, they remain unitary systems, or "organized wholes", in von Bertalanffy's phrase (p. 37). Also, organisms are self-regulatory and change with the changing demands of their environments. Steiner (1978) observed that:

> An organism is a structured whole, i.e., one in which the content and form of its parts are determined by its function. Thus, in such an object the parts do not have non-alterable natures and so fixed actions. Rather parts act interdependently to maintain function, and thereby wholeness. The parts do not simply combine and then determine what the whole is to be. The content and form of the parts change relative to a whole. Therefore, in an organismic state of affairs the emphasis is on the whole or state of affairs taken as determining its parts. Representations of organized complexities are generated through organismic models. (p. 23)

Self-regulating systems can be constructing, maintaining, or destructing; only good human practices constitute constructing systems.

Another property of organismic systems, of organized complexities, is that they can be ordered with respect to their qualities of complexity, and so hierarchic order is manifest in both their structures and their functions.

General systems theory thus rejects mechanistic views of human beings and treats them as entities of organized complexity of the highest order, as functioning wholes both in their individual capacities and in their social organization. Von Bertalanffy (1968) asserted that:

> Reality, in the modern conception, appears as a tremendous hierarchical order of organized entities, leading, in a superposition of many levels, from physical and chemical to biological and sociological systems. Unity of Science is granted, not by a utopian reduction of all sciences to

> physics and chemistry, but by the structural uniformities of the different levels of reality. (p. 87)
> . . . .
> The attitude that considers physical phenomena as the sole standard of reality has lead to the mechanization of mankind and to the devaluation of higher values.
> . . . .
> The organismic conception does not mean a unilateral dominance of biological conceptions. When emphasizing general structural isomorphies of different levels, it asserts, at the same time, their autonomy and possession of specific laws. (p. 88)

Moreover, he observed that:

> The ultimate precept of a theory of organization is that human society is based on the achievements of the individual. (p. 53)

Thus, robot models of human behavior and social organization must give way to models of organized complexity.

2.2. Indigenous Treatments of General Systems Theory

General systems theory has not penetrated the definitional literatures of library science and information science to any appreciable extent. Although a few textbooks and journal articles have utilized general systems theory for other objectives, it has not been used systematically as a means of defining the domain of interest to the present inquiry. The few treatments identified in the literature have been conceptually distorted, moreover.

In the first category of distortions is the popular notion of 'systems analysis', which is understood to refer to studies of the efficiency of current organizational operations. The organization and its objectives are taken as givens; whether their existence is philosophically warranted is beyond the scope of systems analysis. The focus of systems analysis is illustrated in the following excerpts

from the definitional literatures. Swanson (1963) noted that:

> Proper formulation of requirements is a most neglected aspect of library systems analysis and this task falls squarely between the librarian and the engineer. Librarians, by and large, cannot be expected to do an adequate job without a good appreciation of what technology can reasonably be expected to provide. Too few engineers take the trouble to look beyond hardware and book-charging systems in order to understand the profound conceptual problems of libraries. (p. 589)

Reynolds and Daniel (1974) argued that an organization such as a library could be taken as coterminous with the notion of system, and that the managerial subsystem was thus at the center of the system. They diagrammed the relationships of organizational subsystems to each other and to the environment in the following way:

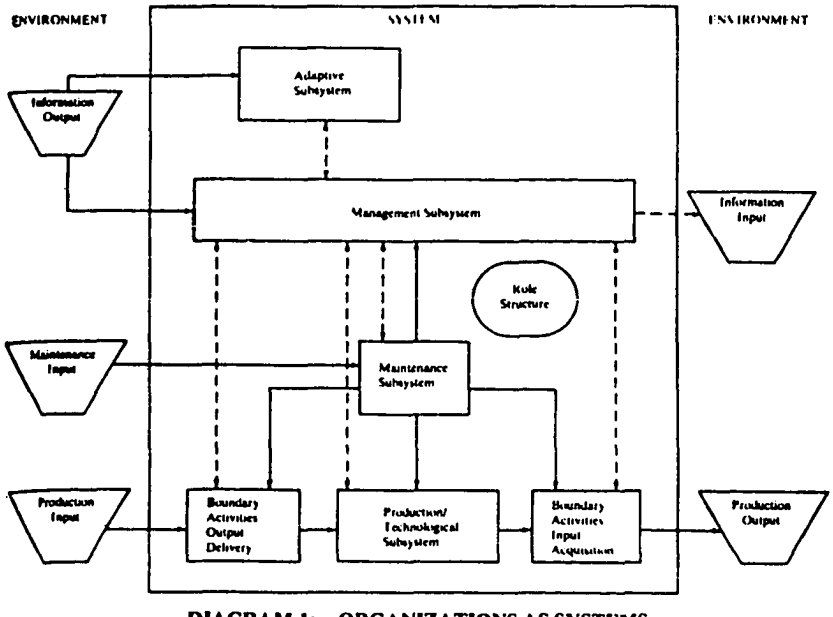


DIAGRAM 1: ORGANIZATIONS AS SYSTEMS (p. 3)

[reduced from original size]

The authors asserted:

> Systems theory takes into account the structuring of events in the organization, the effects of changes in human inputs,

> and the interaction of the organization with its environment. (p. 3)

Similarly, Lubans and Chapman (1975) equated systems analysis with scientific management of library operations (p. 1).

Smith (1980) also treated the systems approach as essentially organizational. He wrote:

> [In] seeking to apply the systems, or scientific, approach to organisational problems, we have maintained a distinction between the use of general conceptual models to help in achieving a realistic framework for thinking about solutions, and the more detailed application of specific professional techniques;. . . (p. 114)

His organizational focus was reflected in the following systems diagram:

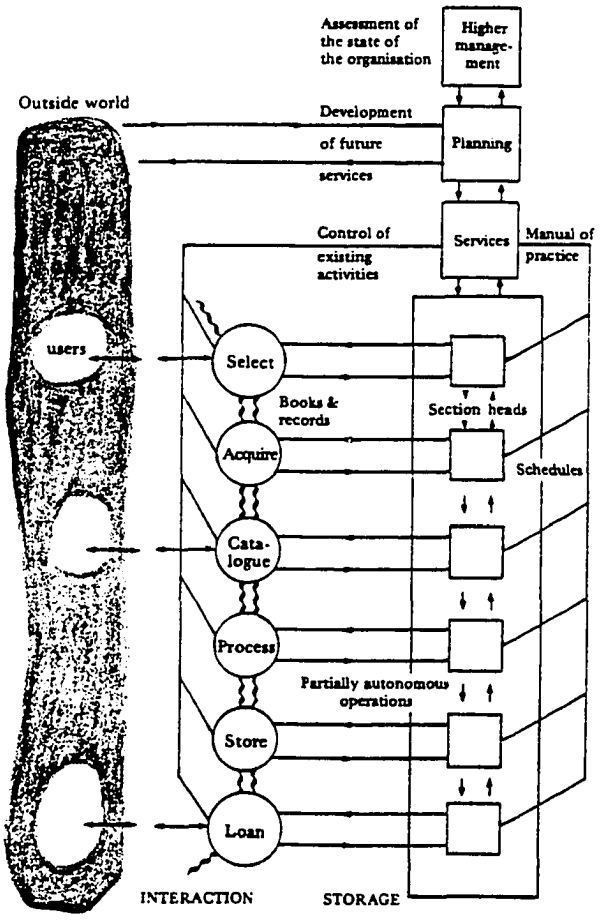


Figure 11: Library operations (p. 87)
[reduced from original size]

Comments

A library is not a system. It is, rather, the physical setting of a system. The human social system of which the library is one institutional manifestation goes far beyond the physical building focus. The notion of library systems analysis is thus too narrow conceptually to characterize the larger social practice in which complexity of interrelated components must be treated. Organizational efficiency is what is wanted in systems analysis.

The second category of conceptual distortions of general systems theory in the definitional literatures of library science and information science consists of somewhat informal and thus incomplete treatments of it. Swanson (1963), for instance, defined a system as "a collection of people and machines organized for a purpose" (p. 589 in Reynolds and Daniel, 1974). Parker (1970) took a system to be "a set of components interacting with each other within a boundary that filters both the kind and rate of flow of inputs to and outputs from the system" (p. 2) and a system boundary as "that region separating the system from other systems and from the environment" (pp. 2-3). Hanks and Schmidt (1975) argued that general systems theory could function as a "paradigm" for professionalism that would be "hospitable to change", as an alternative to the established professionalism model which was alleged to encourage resistance to change (p. 175). They proposed a model of "open systems professionalism" for librarianship, one which would recognize "that a profession, as a social phenomenon, must interact with its environment" (p. 181). They stated that:

> Open systems librarianship would import energy from the

> environment (the community) in the form of money, social and political influence, and raw information. Then, using feedback about the needs of the community, librarians would transform this energy into library services which would be released back into the environment.
> . . . .
> The need for the library to achieve a high lateral as well as a high longitudinal concern for its clientele suggests that a . . . major consequence of open systems librarianship would be the development of more client-centered roles for librarians, and the concurrent deprofessionalization of functional roles, such as cataloging and reference. (p. 182)

Orr (1977) purported that general systems theory "allows one to examine further the concept of a library and to formulate a base philosophy from which an organization may be built" (p. 3). He said:

> [It] is assumed that the parts of a library system may be grouped into three main areas: people (staff and readers); recorded communications within the library; and buildings, furniture, and equipment (or, in reverse order, hardware, software, and humanware). (p. 4)
> . . . .
> Feedback systems can . . . be seen as goal-seeking or goal-changing. . . . As man is both goal-seeking and goal-changing, so is his library system.
> . . . .
> Man can be analyzed in terms of a machine and his output calculated, . . . (p. 13)
> . . . .
> Feedback is therefore an essential part of the library system, and this facet of the system must be very carefully controlled if the system is to have its full value. An understanding of how a library feeds back to its readers reveals many of the problems of the management of libraries and is therefore the essence of the work of the librarian. (p. 114)

Comments

The preceding quotations illustrate the variety of conceptual distortions of general systems theory which are found in the definitional literatures of library science and information science. Notions of output, feedback, boundary, environment, information,

system components, and system itself are flawed. They are not coherent with the literature of general systems theory. In many of the illustrations cited above, the work of the founder of general systems theory, von Bertalanffy, is not even acknowledged; others are credited with its formulation, or no one at all.

Observations by Foskett (1972) will serve as a bridge to a more adequate treatment of library and information study within the context of general systems theory:

> [The] importance of [von] Bertalanffy's work for librarians goes far beyond its relevance to classification theory and practice. It can be viewed from three major aspects: (1) the "information" function; (2) the technical or hardware side of implementation; and (3) the concept of a library/information service as itself a system. These three aspects relate to [von] Bertalanffy's own division of General System Theory into systems science, systems technology and systems philosophy.
>
> So much has been written about the information function that it may seem difficult, if not actually impossible, to say anything new. What [von] Bertalanffy has to say, however, will hearten those who believe in dynamic service rather than static selection and curatorship, who hold to the unity of librarianship and information science. (p. 207)
>
> . . . .
>
> The consequence of the systems' philosophical approach is that libraries should never be considered as ends in themselves, as closed systems, but as open systems in constant interrelation with their environments. (p. 208)

Shera (1973) also observed that:

> To librarianship the value of general systems theory would seem to be this: it makes possible for the first time to study, and to provide the tools for that study, the library and its operations from an holistic frame of reference; as has so often been true in the past, the library has been fragmented into a cluster of specific operations, often without relation to each other, and lacking the realization that what affects one part may have serious repercussions in others. The value of general systems theory to the librarian is yet to be tested, but certainly it promises a profound revolution in science and other areas of thought, and it now appears that it can give to the librarian insights and comprehension that have long been lacking. (p. 105)

2.3. Exogenous Treatments of General Systems Theory

2.3.1. Overview

While there are many comprehensive relatings of general systems theory to various domains of scholarly inquiry, these have not been analyzed and compared here in order to determine their conceptual adequacy or inadequacy. Such a task is a metatheoretical one for logicians and epistemologists. It is possible, however, to consider a particular exogenous treatment of general systems theory as a model for formulating a more rigorous view of library and information practice.

2.3.2. The SIGGS Theory Model Approach

The logic for proceeding in the present inquiry, for giving meaning and precision to the notion of accessing as a kind of system in human affairs, is provided by the 'SIGGS' theory model approach. This metatheory is an extension of von Bertalanffy's general systems theory through the theory models approach which is an extension of Peirce's conception of retroductive inquiry described earlier.

The SIGGS theory model approach was formulated by Steiner Maccia and Maccia (1963), by integrating set theory (S), information theory (I), graph theory (G), and general systems theory (GS). Other treatments and refinements of the SIGGS approach are found in Steiner Maccia and Maccia (1963, 1966, 1969, 1976) and in Steiner (1965, 1978). Steiner Maccia and Maccia (1976) set forth the general objectives of the SIGGS theory model approach:

> The SIGGS theory model has been formulated in order to provide

> a conceptual paradigm for describing any system whether it be physical or biological or hominological. Consequently, SIGGS is for describing atoms as well as educational organizations. Since SIGGS is for devising generalizations which characterize the properties of any system and the interrelations of these properties, it is a general system theory.
>
> Given SIGG's inherent descriptive function, instrumental functions obtain. When one can characterize systems, one can devise them. Understanding permits designing. Also when one can characterize systems, one can account for their being and can foretell what they will be. Understanding also permits explanation and prediction. When one can diagnose or prognosticate, one can direct the course of events. Understanding, therefore, through explanation and prediction permits control. (p. 1)

Von Bertalanffy contributed two basic concepts which together were given precision by Steiner and Maccia. The first concept was his definition of system as "complexes of elements standing in interaction" (p. 33). The second concept was the observation that structure, the order of parts, and function, the order of processes, may be the very same thing in the last resort, since a similar hierarchy is found in both structure and function (p. 27).

In the SIGGS theory model formulation, a system is taken to be a group with at least one affect relation containing information. Where the group is a human one, two related but distinct functions in association can be identified as an affect or influence relation: one, the function of the affector, the other, the function of the affectee. Since what the system is to do (its functioning) determines what the system is to be (its form and its content), it is patent that functionality defines the universe of discourse. Since the system functioning must take place in a context, setting can be characterized; setting can be physical, cultural, and administrative. Since the system functioning involves the transmission of something from affector to affectee, content can be characterized; content can be material or

non-material or both.

In the SIGGS theory model formulation, then, a system consists of the following set of components and their interrelations:

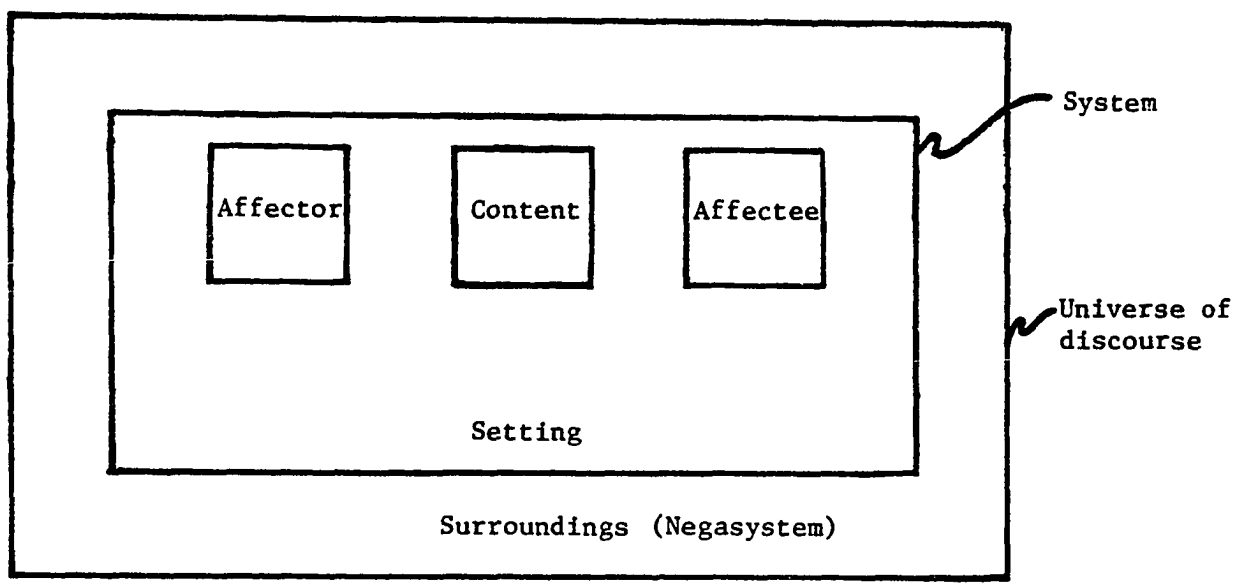
1. affector
2. affectee
3. content
4. setting.

Moreover, that which relates to the functioning of the system but is not one of the components identified above can be characterized as system surroundings, or negasystem.

This completes the configuration of the universe of discourse. The configuration so mapped out can be diagrammed in the following way:

TABLE 13

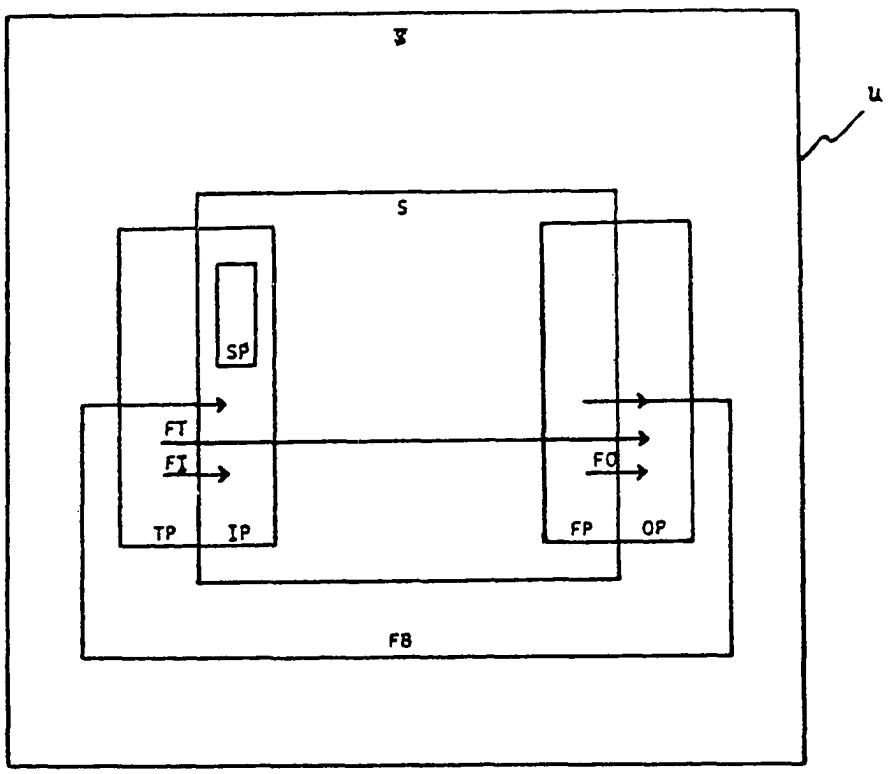
THE SYSTEM THEORETIC NOTION OF A UNIVERSE OF DISCOURSE



In sum, the SIGGS theory model characterizes a system of organized complexity in which the whole is taken as a dynamic configuration that is more than the sum of its parts, and so is irreducible into sequential cause-effect components.

To characterize a system adequately is to sort out those components which belong to the system from those which belong to the surroundings (that is, to the negasystem). This does not mean that only one system characterization is possible. What is taken as a component in one universe of discourse could be taken as the system in another, so long as consistency and coherence are honored. However, it would be conceptually inadequate to consider a human social system in the context of a computer chip, or a library system in the context of the human memory system.

When the relations between a system and its surroundings are characterized, informational interactions or informational transmissions can be identified and measured. Such transmissions constitute more than input-output-feedback relations which describe mechanistic systems. Also, transmissions are not uni-directional, but are taken as changes in patterns of the whole of the universe of discourse. When information theoretic properties of a system in a universe of discourse are set forth, the transmissions and affect relations can be diagrammed as shown by Steiner Maccia and Maccia (1966) on the following page.



'U' stands for universe of discourse
'S' stands for system
'S̄' stands for negasystem
'SP' stands for storeputness
'FT' stands for feedthroughness
'FI' stands for feedinness
'TP' stands for toputness
'IP' stands for inputness
'FO' stands for feedoutness
'FP' stands for fromputness
'OP' stands for outputness
'FB' stands for feedbackness

Figure 1 (p. 99)

[Information Theoretic Properties of a Universe of Discourse in the SIGGS Theory Model]

Steiner Maccia and Maccia (1966, 1969) and Steiner (1978) have used the SIGGS theory model approach to characterize the domain of educational life. Taking education as a system, the teaching-studenting process can be characterized in which guided learning and intended learning occur, in which a selection from the culture is transmitted,

and in which there is both a setting and system surroundings. Four components and their interrelations make up the teaching-studenting system, then: teacher, student, curriculum, and setting; and nega-system surroundings complete the mapping of the domain.

If the discourse of library and information science is taken as the accessing system of human social affairs, then the SIGGS theory model approach will give shape and precision to the system, as it has been shown to do for the educational domain. Comparable components, functionings, and interrelations must be formulated. These formulations are the objective of the remainder of this chapter.

3. Definition of Library and Information Science: The Symbolic Culture Accessing System

3.1. Description of the Social Practice

In the unique social practice which marks off the discourse of library and information science, there are two fundamental processes in the 'access system' or the 'accessing system': guiding access, and seeking access. 'Access relations' or 'accessing relations' characterize this system of social practice where the access seeker is taken as active. In such a practice, one person is trying to make something accessible to another person who is seeking access to that something. The practice of access facilitation is stipulated.

In the accessing system so characterized, the person who is trying to facilitate access, the mediator or intervenor in the communication flow, is the librarian or information consultant (interchangeable terms). The person who is seeking access is the user.

The something being made accessible and being sought is a selection from reproduced objectifications of symbolic culture, that is, from symbolic objects that are reproductions of original symbolic objects. These accessing relations also require a context in which they can be manifested, a context of physical settings, administrative settings, and cultural settings.

Issuing from the SIGGS theory model approach, then, the universe of discourse of library and information science is taken to consist of four sets of components and their interrelations:

1. the librarian or information consultant, system affector
2. the user, system affectee
3. the selection from available reproduced symbolic culture, system content
4. the setting, system context encompassing physical, administrative, and cultural characterizations.

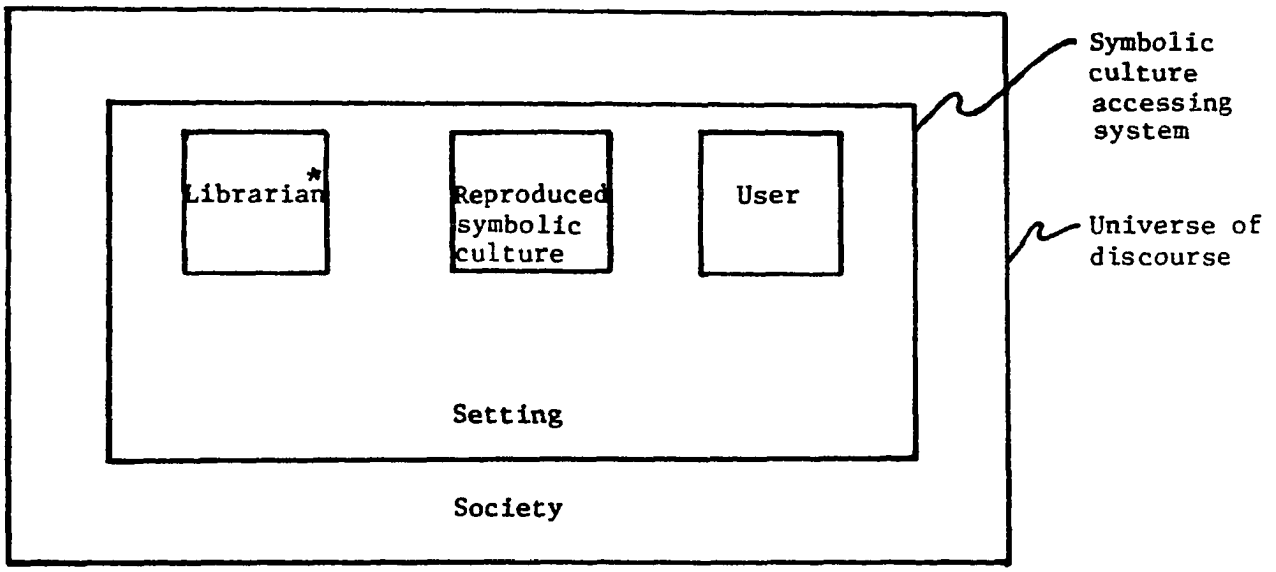
Delineation of system surroundings, the society from which the selection of reproduced symbolic cultural objects is taken, completes the mapping of the universe of discourse.

Thus, the universe of discourse of library and information science can be characterized as the 'symbolic culture accessing system'. The discourse can be represented structurally on the following page.

Each of the components of the discourse is then explicated.

TABLE 14

THE SYMBOLIC CULTURE ACCESSING SYSTEM OF LIBRARY AND INFORMATION SCIENCE



* Information Consultant (used interchangeably)

3.1.1. Librarian or Information Consultant Function: Guiding Access

The function of 'guiding access' is taken to be fully synonymous with such terms as 'to provide access', 'to make accessible', 'to make available', and their grammatical paradigms. The OED (1933) gave the usage of the noun 'access' as: a coming to or towards, approaching; a way or means of approach; a coming as an addition; a coming on or attack of illness, anger, etc. (the latter need not concern this inquiry unduly). The term 'accessible' was documented as: capable of

being used as an access, affording entrance, open, practicable; capable of being entered or reached, easy of access, such as one can go to or come into the presence of or reach or lay hold of, get-at-able. According to Fowler's (1965), the term 'access' signifies opportunity of approaching, of entering, or of getting there. In the OED Supplement (1972) the term 'access-time' is noted as the time taken to reach "information" stored in a computer.

Although the present inquiry has not attempted to document systematically and comprehensively the historical usage of 'access' and 'accessibility' in the professional literature, it was noted in Chapter Two that Schrettinger used the term 'accessible' in 1808 and Dewey in 1886, and that Jewett used the term 'public access' in 1853. Moreover, the notion of 'open access' shelving dates from at least the late 1800s; Harrod (1938) applied the term 'open access' to a library where readers are admitted to the shelves.

In addition to the document usages mentioned above and those already identified in the definitional literatures of library science and information science, a few contemporary references are noted. 'Accessibility' has long been mentioned in the general scholarly literature as an important empirical factor in library user behavior. Waples (1932), for instance, pointed out that physical accessibility of materials, bibliographic accessibility, and intellectual accessibility or "readability" were important determinants of reading. Fussler (1950) discussed factors of physical accessibility to library materials. Hertz and Rubenstein (1953) noted the influence of physical accessibility in the use of published literature. Fairthorne (1954) described access as "the arrangement of things on successive

levels so as to minimize the average time or effort to find an item, or with that intention" (p. 263). Allen (1966) hypothesized that the accessibility of an information source was the most important determinant of use, while factors of quality and reliability were taken to be secondary. Allen and Gertsberger (1967) studied the information-seeking behavior of a sample of engineers and concluded that there was empirical support for the hypothesis that accessibility is the primary determinant of information channel use. Woodburn (1969) hypothesized that differing levels of accessibility, ranging from the accessibility level of personal collections to that of departmental collections and to that of university libraries, influenced usage of materials. Jordan (1970) investigated alternatives of "direct access and delivery" for future library scenarios. Goldhor (1972) studied the effect of high accessibility, that is, prime location, on library circulation. Hyman (1972) wrote of the factor of "access to library collections". Soper (1972) also studied the effect of accessibility on literature use. Dervin (1973) postulated "accessibility factors" and "barriers to information accessibility" (pp. 13-17). In her review of the literature and bibliography of the social sciences, Friedes (1973) noted the fundamental requirement for "access to the total literature of a field" (p. 140). Dougherty and Blomquist (1974) claimed that collection accessibility was regarded as more important to university scholars than was collection comprehensiveness. Hamburg and others (1974) wrote of providing access to documents as a major library function (p. 60). Harris (1974) studied the effect of physical location on academic library use. Line (1974) argued that use is "heavily dependent on provision

and availability of library and information service" (p. 87). UNESCO (1974) asserted that "information is an essential part of a nation's resources and access to it is one of the basic human rights" (p. 25).

Lancaster (1977) argued that, because the library exists as an interface between the universe of bibliographic resources and a particular user population, the overall objective of the library is to make the most immediately relevant resources "maximally accessible to its users" (p. 5). He described the effect of physical accessibility and ease of use on user selection of information sources, concluding that:

> Ease-of-use factors include physical accessibility (e.g., where the library is located and where various portions of the collection are stored) and "intellectual" accessibility (e.g., how well a collection is cataloged or indexed, how easy the catalog is to use, how clearly the shelves are signposted), as well as miscellaneous accessibility factors governed by library policies (e.g., which books may circulate and for how long, how many books may be borrowed at one time, and so on). (p. 312)

He argued further that accessibility and the principle of least effort as enunciated by Zipf were isomorphic, the major determinant of the use of libraries and other sources of information (p. 319). The Division of Science Information of the National Science Foundation (1977) described one of its four major programs supporting information science research as "access improvement research", which included "researching ways of getting newly discovered information into the public record; providing access to the public record of science and technology; and identifying, locating, obtaining, and using information" (p. 282 in the American Library Association Yearbook 1977). Asheim (1979) argued that "the role of the library in giving access to information without prescription, for example, may be a value worth

preserving" (p. 253). Darling (1979) wrote that libraries "have become a major channel of unfettered access to all forms of expression" (p. 315). Weber (1980) contended that in academic libraries of the future, "nearly all library records and data will be accessed on line" (p. 26). Cuadra Associates (1981) prepared a list of research priorities for the library and information field for the 1980s, among which was a major project area identified as "information access" research that was intended "to advance the information and library community's understanding of the interfaces between online systems and their users" and in which each project would "examine the way users access information" (p. 37).

Finally, Lancaster (1982), in his response to the keynote address at the 1982 general conference of the International Federation of Library Associations held in Montreal, Canada, made the following references to the notion of 'accessibility':

> Before computers, the only way to make an information source accessible was to buy it. When a library purchases a book or periodical, it does so for one reason and one reason only: to make it accessible to library users. This accessibility is achieved through a capital investment in the physical availability of materials on library shelves. Through its acquisitions policy, a library divides the universe of bibliographical resources dichotomously: those things it adds to its collection and those it does not. In effect, the universe of bibliographic resources has been divided into two levels of accessibility: things immediately accessible and others less immediately accessible. A subscription buys only access. (pp. 14-15)
>
> . . . .
>
> The ability to access a data base online changes all of this. A library need not make a capital investment in an electronic publication to make it accessible. It can be assessed when needed; the library pays only for the amount of access used at the time it is used. (p. 15)

He argued that de-institutionalization of the profession would lead to a refocusing away from library ownership toward access provision.

These various usages of access and accessibility provide a plausible context for giving precision to and elaborating notions of the librarian as access facilitator in the symbolic culture accessing system.

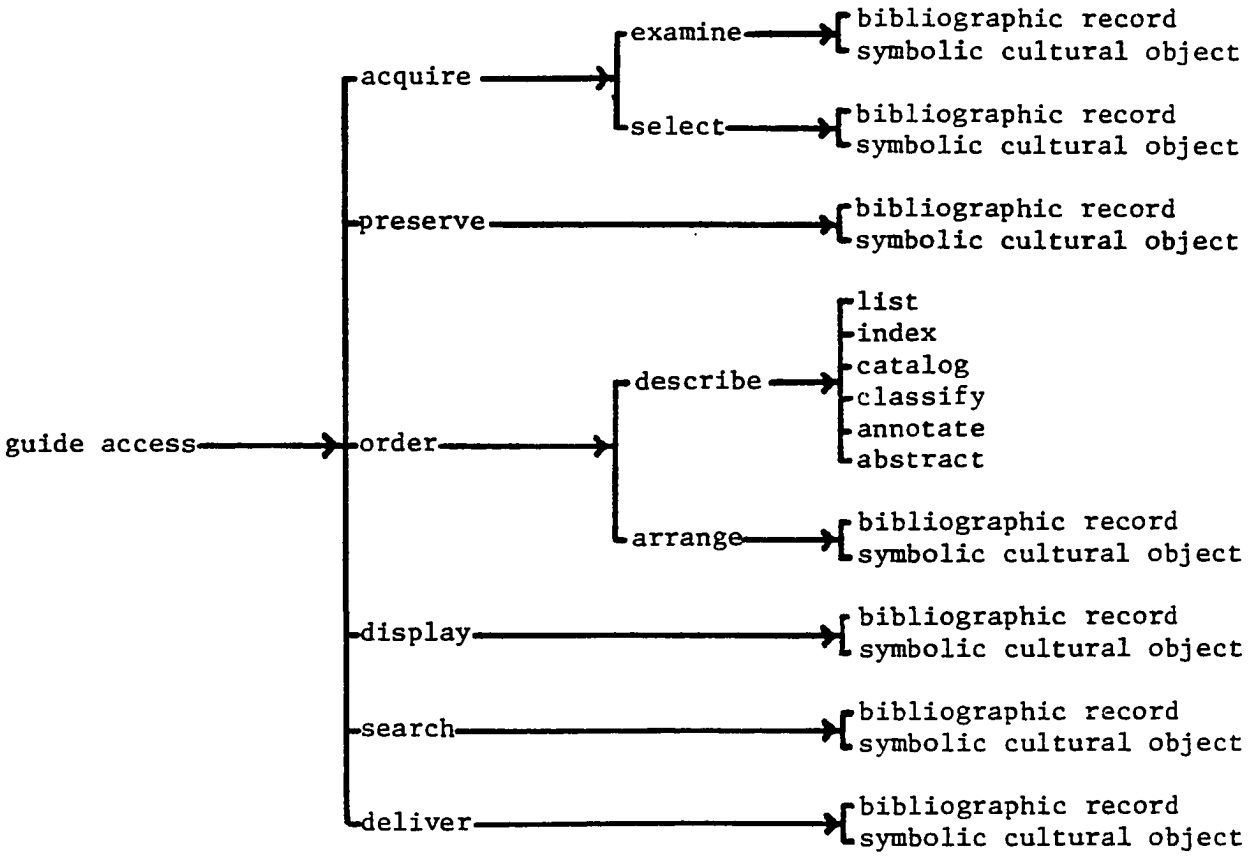
The accessibility function of the librarian or information consultant encompasses a sequence of activities. They are: to acquire, to preserve, to order, to display, to search, and to deliver. The activity of acquiring involves examining available symbolic cultural objects or their surrogates in order to determine a match with user access specifications. Where user criteria are met, selection occurs. The activity of ordering is taken to be any process of putting the selected objects or their surrogates into conceptual or physical array. Two forms of activity are required: describing and arranging the objects or their surrogates. Such description takes the forms of listing, indexing, cataloging, classifying, annotating, and abstracting. The products of these activities can be described broadly as 'bibliographic records'. They are surrogates of the symbolic cultural objects. Each form of description produces a corresponding form of bibliographic record, such that listing produces a bibliography, indexing produces index records, cataloging produces catalog records, classifying produces a classification scheme or thesaurus, annotating produces annotations, and abstracting produces abstracts. The activity of displaying is taken to be any process of storing and rendering physically manifest either symbolic cultural objects or their surrogates to the human senses. The activity of searching is taken to be any process of looking for and identifying these objects or their surrogates. The notion of delivering is taken to be any process of

supplying to the user either these objects or their surrogates.

The unpacking of the librarian or information consultant's function permits the following diagrammatic representation:

TABLE 15

THE LIBRARIAN OR INFORMATION CONSULTANT'S FUNCTIONING IN THE SYMBOLIC CULTURE ACCESSING SYSTEM



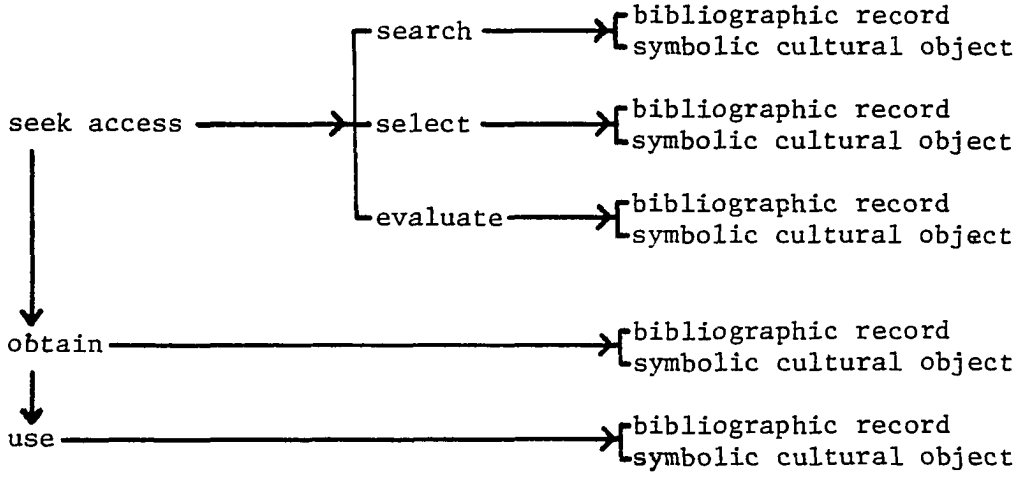
3.1.2. User Function: Seeking Access

The person who is actively seeking access and who,

when successful, obtains and uses the sought symbolic cultural objects is described as the 'user'. User functioning encompasses a sequence of activities which relate to either symbolic cultural objects or to their bibliographic surrogates. The sequence of accessing activities includes searching, selecting, and evaluating these objects or their surrogates. When the user's access seeking is successful, sought objects or surrogates are obtained and then used; 'to use' can take many forms and is not further elaborated in the present inquiry. The user's functioning as an access seeker can be diagrammed in the following way:

TABLE 16

THE USER'S FUNCTIONING IN THE
SYMBOLIC CULTURE ACCESSING SYSTEM



3.1.3. System Content: Reproduced Symbolic Culture

The 'something' in the accessing system which is the object of guided and sought access is a selection from available reproduced symbolic culture. The term 'culture' encompasses ideas and values internalized by persons operating in their human groups, and the products of behavior and action which take the forms of symbols and artifacts. Following Kroeber and Kluckhohn (1952), culture is taken as follows:

> Culture consists of patterns, explicit and implicit, of and for behavior acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiments in artifacts; the essential core of culture consists of traditional (i.e., historically derived and selected) ideas and especially their attached values; culture systems may, on the one hand, be considered as products of action, on the other as conditioning elements of further action. (p. 357 - italics removed)
>
> . . . .
>
> Culture is not a mystical "force" acting at a distance. Concretely, it is created by individual organisms and by organisms operating as a group. It is internalized in individuals and also becomes part of their environment through the medium of other individuals and of cultural products. Acts take place: (a) in time between persons, (b) in space in an environment partly made up of other persons. But because acts take place in time the past continues to influence the present. The history of each group leaves its precipitate --conveniently and, by now, traditionally called "culture"-- which is present in persons, shaping their perceptions of events, other persons, and the environing situation in ways not wholly determined by biology and by environmental press. Culture is an intervening variable between human "organism" and "environment". (pp. 367-368)
>
> . . . .
>
> As a matter of general theory, it must never be forgotten that there is a ceaseless interaction between personality (or individual variability) and culture; that only persons and not cultures interact in the concrete, directly observable world; and the like. (p. 368)

Culture that is not symbolic is ruled out of the accessing system. That is to say, the accessing system treats of the representational dimension of human culture expressed as ideas and values

in object form. The term 'symbol' stands for a representational sign, "a written character or mark used to represent something; a letter, figure, or sign conventionally standing for some object, process, etc." (OED, 1933). Non-symbolic culture is thus excluded.

Moreover, 'symbolic culture' is the preferred term over either 'information' or 'knowledge' or 'cognition'. In the literatures of library science and information science, the concepts of information, knowledge, facts, data, "the enduring treasure of the whole human past", and similar expressions are conflated with the notion of all human experience.

However, not all human experience, not all culture, is manifested as symbolic culture; all human experience, all culture, encompasses more than 'symbolic culture'. Such notions as information, knowledge, or like expressions, when taken as synonymous with all human experience, suppress standards of rationality and judgment, whether in science, philosophy, art, or social practice. 'Facts' or 'data' taken as synonymous with 'knowledge' rules out not only all non-scientific knowledge, but also all conceptual structures--theories, methods, logic, and mathematics--in which scientific knowledge is grounded. As von Bertalanffy (1968) observed pointedly:

> According to widespread opinion, there is a fundamental distinction between "observed facts" on the one hand--which are the unquestionable rock bottom of science and should be collected in the greatest possible number and printed in scientific journals--and "mere theory" on the other hand, which is the product of speculation and more or less suspect. I think the first point I should emphasize is that such antithesis does not exist. As a matter of fact, when you take supposedly simple data in our field--say, determination of Q_{O_2}, basal metabolic rates or temperature coefficients--it would take hours to unravel the enormous amount of theoretical presuppositions which are necessary to form these concepts,

> to arrange suitable experimental designs, to create machines doing the job--and this all is implied in your supposedly raw data of observation. (p. 155)

Moreover, the notion of 'cognitive culture' taken as the content of the accessing system tends to exclude too much of human culture; there are other aspects of the mind in addition to the cognitive aspect which deals with propositions of truth or falsity. Presumably, it is a category error to subsume the affective and conative dimensions of the human being under the cognitive dimension, even if it is argued that there is a cognitive carrier for these affective and conative dimensions.

Thus, the content of the culture accessing system is delimited to symbolic objectifications of culture.

However, the content of the system encompasses more than what is taken as positive symbolic culture. Negative culture also exists. Among its diversity of forms are: opinion, perverse culture, misinformation, rhetoric, slogans, propaganda, slander, lies, superstition, scientific fraud, prejudice, hate literature, irrationality, insanity, laws, political constitutions, and news. Whether any of these negative manifestations of culture are worth preserving and so being made accessible is an axiological problem for library and information science. The conceptualization of the content of the system must, in any event, be large enough to admit them as a theoretical possibility.

Symbolic culture that is not objectified, not recorded in some kind of artifactual form, cannot be the content of the accessing system, because intervention by a facilitating human agent is ruled out. An artifactual carrier is required. In unrecorded

symbolic culture, transmission is direct from person to person. There is no place for a librarian or information consultant.

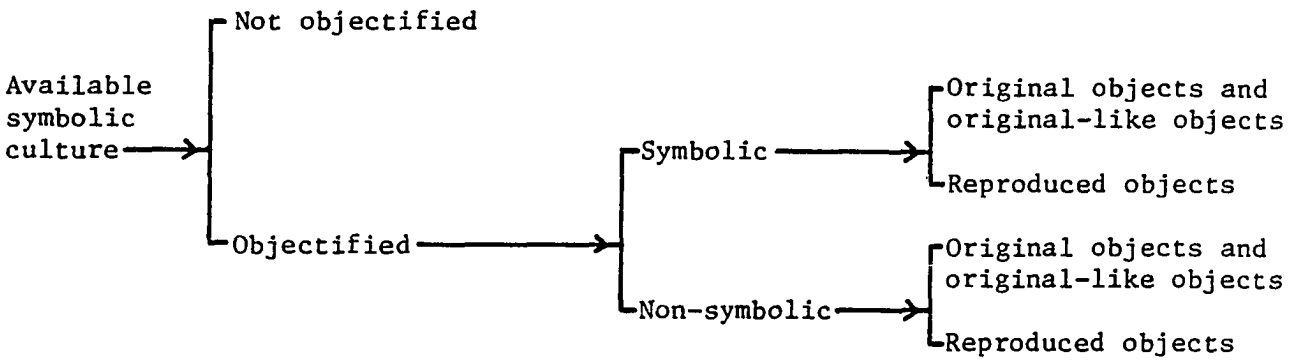
Also, recorded symbolic culture that consists of original manifestations, of original artifacts, is excluded from the accessing system, because the originality of objects is an added property, and so modifies and transforms the predominant focus of human social interest. Since original objects have intrinsic value, they are unlike their reproduced copies which do not have intrinsic value qua objects. In systems where the originality of cultural objectifications is at issue, functions other than the accessing function of the librarian or information consultant are involved, for example, determination and preservation of originality. Thus, art galleries and museums of human culture (as well, of course, as museums of non-human phenomena) are excluded from the symbolic culture accessing system. In passing, it might be noted that the rare books library is a possible anomaly, deserving further theoretical consideration.

Moreover, not all reproduced symbolic culture is available to the accessing system; much has been lost in antiquity, or destroyed. Therefore, there is a further ruling out from the system of unavailable objectifications of symbolic culture.

Thus, the object of the discourse of library and information science is taken to be available reproduced symbolic culture, or, available copies of symbolic cultural objectifications. The following classification is derived from this conceptual analysis:

TABLE 17

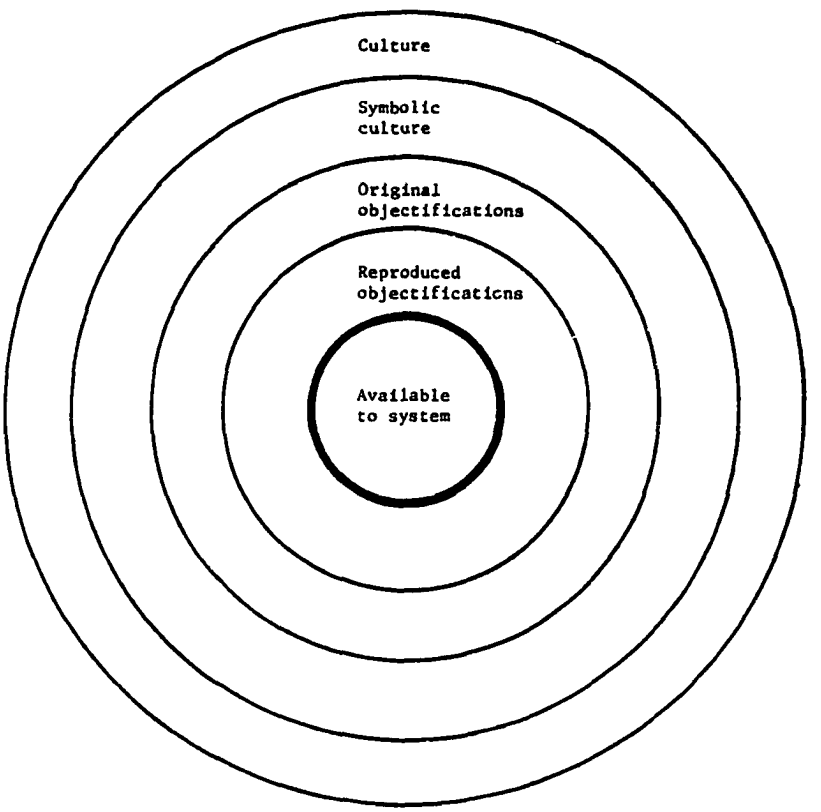
CLASSIFICATION OF AVAILABLE SYMBOLIC CULTURE
WITH RESPECT TO FORM



The relationship of human culture to the content of the accessing system can also be visualized as a series of concentric circles:

TABLE 18

THE RELATIONSHIP OF SYSTEM CONTENT TO CULTURE



It is also patent that the accessing system does not take in the entirety of available reproduced symbolic culture, but must select from what is available in a society. From an empirical point of view, total comprehensiveness is impossible. Not enough storage capacity exists and not enough human capacity exists to render accessible the totality of symbolic cultural objects. Selective omission becomes the focus; according to Besterman (1940), the first and last successful universal bibliography was Conrad Gesner's which was published between 1545 and 1555 (p. 20)--and of course even this bibliography could not include what had already been lost and destroyed.

In addition, from a philosophical point of view, total comprehensiveness is undesirable. Some cultural manifestations are less intrinsically valuable than others. Ideas and values which meet truth criteria are the symbolic culture that ought to be made available. Transmission of knowledge is what is wanted. As Donaldson (1977) argued:

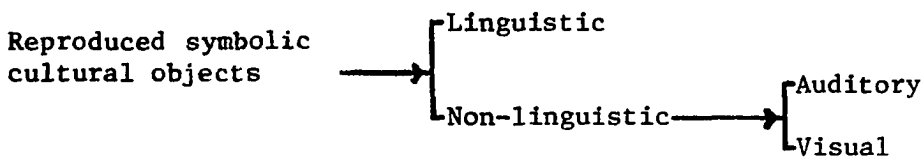
> Manifestly not all knowledge is useful. Nor can the whole of the past be preserved. The country cannot be turned either into a gigantic library or a gargantuan museum. Someone has to exercise selection. (p. 274)

This conceptualization of knowledge as the selected content of the symbolic culture accessing system is elaborated below in Section 4, "Summary Evaluation".

Another classification of available symbolic cultural objects that is relevant to the domain of library and information science is with respect to kinds of symbolic cultural expression. Linguistic expression, the discursive, can be sorted out from non-linguistic expression, the non-discursive, and within the latter, the auditory can be distinguished from the visual.

TABLE 19

CLASSIFICATION OF AVAILABLE SYMOBLIC CULTURE
WITH RESPECT TO KIND OF EXPRESSION



Moreover, cross-classifications can be formulated: for example categories of content (knowledge, opinion) with categories of expression (linguistic, non-linguistic). Further elaborations are possible by crossing other classes of properties, or by delineating elements within a property; with respect to the latter, for example, the class of reproduced linguistic culture can be specified as to object forms, such as handwritten, print, and computer bits, or, alternatively, published and unpublished.

Two notions worth further consideration as the object of library and information science are 'graphic records' and 'recorded discourse'. The primary difficulty with them is that they encompass both original objectifications and their reproductions. Also, graphic records excludes non-graphic objects such as computer files, and recorded discourse taken as linguistic expression rules out non-linguistic expressions such as audio recordings and art.

Finally, too much of human experience must not be taken as the object of the culture accessing system. The 'generic book' purported

by Shores (1974) to encompass the sum total of man's communication possibilities rules out the intervening or mediating agent. Moreover, the inclusion of not only all written forms and audiovisual formats but as well the sensory media of touch, taste, and smell, together with extrasensory formats of telepathy and clairvoyance (p. 203) is a flawed description that conflates human perception with the objectifications of human perception.

The content of the accessing system is taken in the present inquiry to be the repertoire of artifactual carriers of symbolic culture that require mediation, or intervention, in order that they be rendered accessible when wanted.

3.1.4. System Context: Physical and Social Settings

The context in which the guiding and seeking of access to reproduced symbolic culture occurs is comprised of objects, persons, and symbolic characterizations. The objects are the physical setting, such as a library building, a computer, or a computer within an information center. The persons are administrators, financial and personnel officials, computer programmers, systems analysts, and custodians. Symbolic characterizations are cultural contexts such as middle class culture, popular culture (following Gans, 1974), democratic culture, socialist culture, totalitarian culture, working-class culture, urban culture, or illiterate culture.

3.1.5. System Surroundings: Society

The surroundings of the symbolic culture accessing system are taken to be the totality of human society; in particular, typologies of the producers of symbolic culture and of the "reproducers" of symbolic culture, such as publishers, must be worked out, for they bear particular influences from the larger culture on the accessing system.

3.1.6. Summary

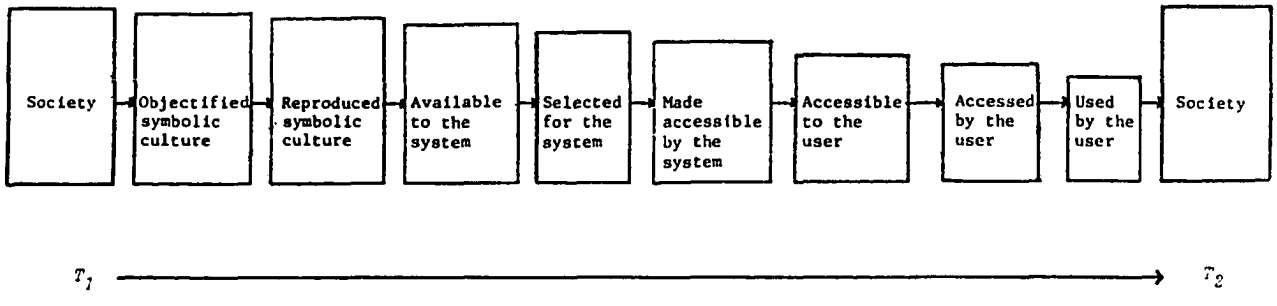
The universe of discourse, the domain, of library and information science is thus taken in the present inquiry to be the symbolic culture accessing system. This system is constituted of four components and their interrelations. Taken together with system surroundings, the larger society, they characterize the discourse of library and information science. The system components are specified as: the librarian who is guiding or facilitating access; reproduced carriers of symbolic culture; the user who is seeking access to those carriers in order to use them in some (so far unspecified) way or ways; and, the context in which the accessing relations occur. The flow or transmission of symbolic culture in the accessing system is a sequence of accessor and accessing roles in interrelation with each other and with other system components, over and above transmissions with system surroundings.

Not only the structure which is described by the above specification of components must be characterized. Functioning over time must also be represented. The diagram below illustrates the

symbolic culture accessing system as a process or series of processes over time. (The height of each rectangle is broadly suggestive of the "magnitude" of symbolic culture being transmitted at each stage.)

TABLE 20

THE TRANSMISSION OF CULTURE IN THE SYMBOLIC CULTURE ACCESSING SYSTEM

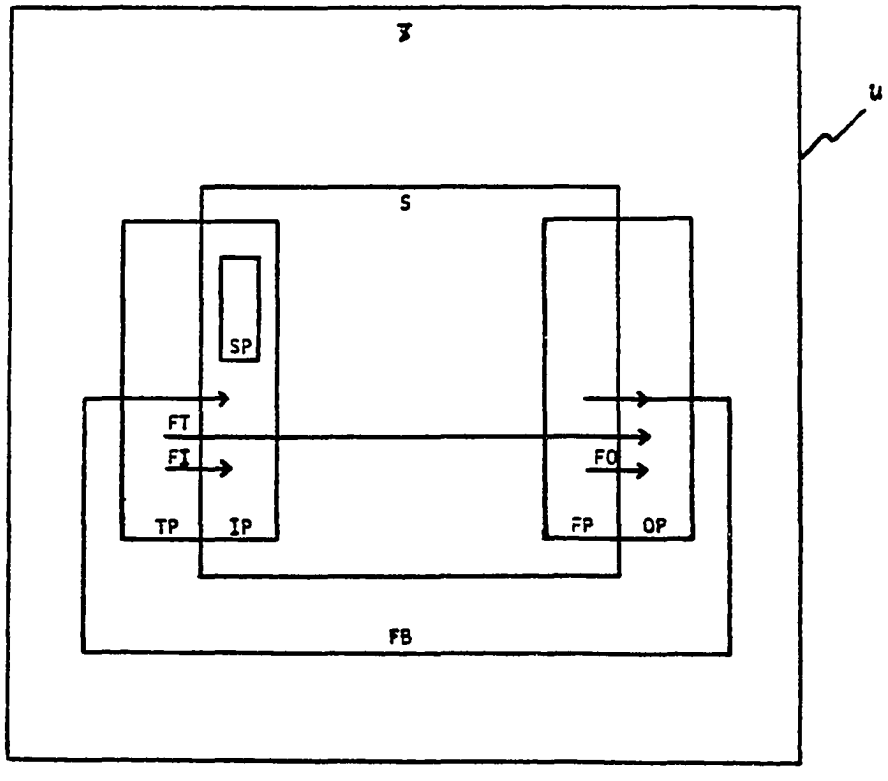


'T_1' stands for a point in time
'T_2' stands for some later time

Following the SIGGS theory model, the information theoretic properties of the symbolic culture accessing system can be represented as follows:

TABLE 21

INFORMATION THEORETIC PROPERTIES OF THE
SYMBOLIC CULTURE ACCESSING SYSTEM



'u' stands for universe of discourse
'$\bar{S}$' symbolic culture accessing system
'$\bar{\bar{S}}$' society, surroundings
'TP' symbolic culture available from society to the system
'IP' symbolic culture selected from society by the system
'FP' symbolic culture made accessible by the system to society
'OP' symbolic culture selected from the system by society
'SP' symbolic culture available only within the system
'FI' commonality of symbolic culture available to the system and symbolic culture selected by the system
'FO' commonality of symbolic culture made accessible to society and symbolic culture selected by society
'FT" commonality of symbolic culture available from society to the system and symbolic culture selected from the system by society
'FB' commonality of symbolic culture made accessible by the system to society and symbolic culture selected from the system by society

3.2. Inquiry for the Social Practice

Inquiry with respect to the symbolic culture accessing system is marked off by the problems of social practice. Practitioners--librarians and information consultants--seek knowledge in order to control the states of affairs within which they function as access facilitators. They depend on research for their practicing power over problematic states of affairs, conditions, situations, and courses of action. Precepts without concepts are empty; that is to say, principles based on nothing more than tradition, tenacity, or authority are the whims of time, and so have no emergent predictive power.

The practicing power which is wanted takes the form of principles, programs, policies, and products issuing at least in part from knowledge produced by researchers with respect to the symbolic culture accessing system and its surroundings. Researchers qua researchers function to describe sets of properties of the four components of the symbolic culture accessing system and the interrelations of the sets, together with their connections to the interacting society. The objectives of inquiry are thus determined by social access problems. Inquiry, or 'research' as used by Fry (1973), is taken broadly to encompass both "basic and applied research and also development, testing and evaluation," in effect, "any objective investigation regardless of type of method used which is directed to library and information purposes" (p. 249).

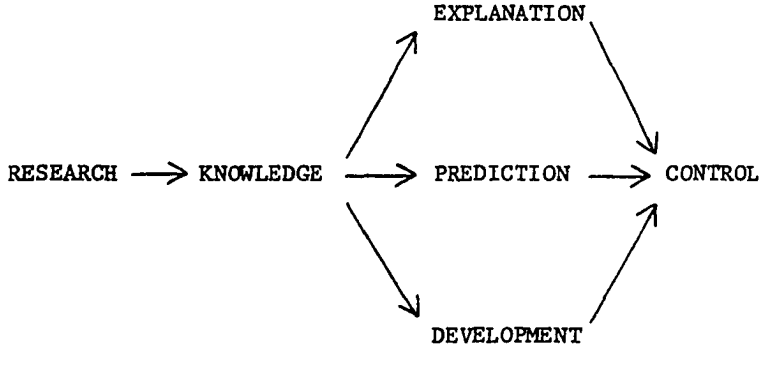
Steiner (1978) has set forth the nature of the inquiry process:

To do research is to formulate and solve problems so that one

> knows about states of affairs. To know about states of affairs is to be able to adequately characterize their unique and general properties and the relations between these properties and to be able to adequately carry them out. Thus, three kinds of knowledge can be distinguished: quantitative which consists of adequate characterizations of general properties and their interrelations, qualitative which consists of adequate characterizations of unique properties and their interrelations, and performative which consists of adequate executions. (p. 1)
> . . . .
> The interrelations between the general properties can be axiological or non-axiological. Non-axiological relations are characterized in science. Axiological relations can be instrumental or non-instrumental. Instrumental relations are means-ends relations, and thus are those in which one or more properties are of value to one or more other properties. Practices are means-ends relationships, and consequently praxiology characterizes instrumental relations. Non-instrumental axiological relations are those in which properties are related as inherently valuable. Philosophy characterizes non-instrumental axiological relations. (p. 4)

The pragmatics of research are then set forth:

> Knowledge . . . is a basis for diagnosis, i.e., explaining why a state of affairs is what it is, prognosis, i.e., predicting what future states of affairs will be, and design, i.e., developing states of affairs. These secondary functions of explanation, prediction, and development permit control. (p. 4)
> . . . .



SCHEMA 3: PRAGMATICS OF RESEARCH (p. 6)

Thus, to undertake symbolic culture accessing system inquiry is to ask questions about the general or unique properties of librarian, user, symbolic cultural carriers, setting, or surroundings, and the relations of these properties. The product of such inquiry is knowledge, that is, adequate ideas about general or unique states of affairs or about doing.

Problems are not all of a kind, however. There are questions, doubts, about empirical phenomena, but there are also questions about values. What is and what ought to be are two entirely distinct realms of thinking. Doubts about unique or pervasive qualities is another such realm. Moreover, doubts about performance must also be addressed. Problems about general states of affairs, problems about unique states of affairs, and problems about activities require differing modes of knowledge production. That is to say, the possible ways of knowing that issue from the possible ways of inquiring are: quantitative, and within quantitative, scientific, philosophical, and praxiological; qualitative; and performative.

The ways of inquiring or producing knowledge to solve problems about these differing states of affairs are as follows: empirical analysis is used to produce scientific knowledge about the empirical properties of the symbolic culture accessing entities; conceptual analysis is used to produce philosophical knowledge about the inherently valuable properties of these entities; empirical and conceptual analysis is used to produce praxiological knowledge about the instrumental properties, or the means-ends relations, of these entities; perceptual analysis is used to produce qualitative knowledge about the unique qualities of these entities; and, transactional

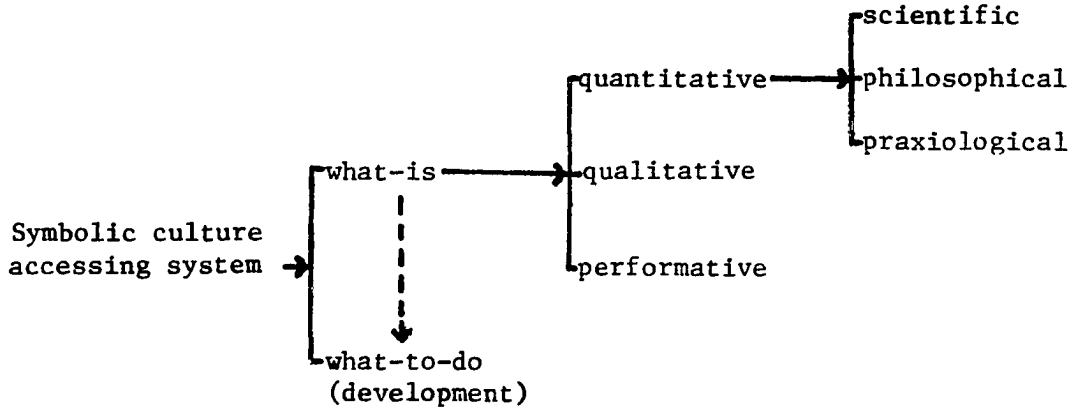
analysis is used to produce performative knowledge about symbolic culture accessing system processes.

Finally, if the problems are problems of what to do in a given time and place, development inquiry is required, in which knowledge is related to the circumstances of the situation, including the statement of objectives and the specification of cost-benefit criteria. Development inquiry when based at least in part on knowledge produces prescriptive knowledge in the form of policies, programs, principles, and products for action.

Inquiry modes and ways of knowing can be represented visually in the following classification scheme:

TABLE 22

INQUIRY MODES AND KINDS OF KNOWLEDGE ABOUT
THE DISCOURSE OF LIBRARY AND INFORMATION SCIENCE



Moreover, the ways of knowing can be cross-classified with system components, so that kinds of research objectives are set forth which are logically adequate in the discourse of library and

information science. The following table illustrates the resulting classes of discourse objectives and how these relate to system components.

TABLE 23

CLASSES OF RESEARCH OBJECTIVES IN
THE DISCOURSE OF LIBRARY AND INFORMATION SCIENCE

Ways of Knowing	System Component				Negasystem
	Librarian (L)	Reproduced symbolic culture (C)	User (U)	Setting (S)	Society (Y)
Scientific (Sc)	ScL	ScC	ScU	ScS	ScY
Philosophical (Ph)	PhL	PhC	PhU	PhS	PhY
Praxiological (Pr)	PrL	PrC	PrU	PrS	PrY
Qualitative (Q)	QL	QC	QU	QS	QY
Performative (Pf)	PfL	PfC	PfU	PfS	PfY

This table not only illustrates the relationship between research objectives and system components, but it also marks off the possible domain of research problems logically presentable as the subject matter of library and information science.

3.3. The Beginnings of a Definitional Chain

This section presents a formalization of those basic concepts of library and information science which have been explicated

by the present inquiry. The concepts are sorted into three sets: defined terms; primitive terms; and terms to be defined. Defined terms are taken to stand for explicated concepts as set forth here. Primitive terms are those taken as the starting point for theorizing and so are not defined. Other definitional terms go beyond the scope of the present work and so await theoretical development in the future. In this way, the first moves as presented here should form the foundation for constructing the entire chain of definitions needed to characterize the domain of library and information science.

Thus, the beginnings of a definitional chain now exist.

Defined terms:

1. 'Library and information science' $=_{df}$ study of the symbolic culture accessing system

1.1. 'Study' $=_{df}$ inquiry into problems

1.2. 'Symbolic culture accessing system' $=_{df}$ the system of social practice of librarian or information consultant and user in which respective functions are performed on a content and in a context

1.2.1. 'System' $=_{df}$ a group with at least one affect relation containing information

1.2.1.1. 'Information' $=_{df}$ characterization of occurrences

1.2.2. 'Social practice' $=_{df}$ an organized doing involving at least two persons

1.2.3. 'Librarian or information consultant' $=_{df}$ the person who guides access to symbolic culture

1.2.4. 'User' $=_{df}$ the person who seeks acess to symbolic culture made accessible by the librarian or information consultant

1.2.5. 'Respective functions' $=_{df}$ guiding access and seeking access to symbolic culture

1.2.5.1. 'Guiding access to symbolic culture' $=_{df}$ acquiring, preserving, ordering, displaying, searching, and delivering symbolic culture on behalf of the user

1.2.5.2. 'Seeking access to symbolic culture' $=_{df}$ searching, selecting, and evaluating symbolic culture made accessible by the librarian or information consultant, in order to obtain and to use the selections

1.2.6. 'Content' $=_{df}$ the reproduced objectifications of symbolic culture selected for and made accessible by the system

1.2.6.1. 'Symbolic culture' $=_{df}$ ideas and values expressed in symbols and encompassing both positive and negative thought

1.2.6.2. 'Symbol' $=_{df}$ a representational sign

1.2.7. 'Context' $=_{df}$ physical, administrative, and cultural settings of the system.

Primitive terms:

'group'
'affect relation'
'characterization of occurrences'
'performed'
'organized doing'
'person'
'idea'
'value'
'thought'.

Terms to be defined in future theorizing:

'inquiry'
'problems'
'to acquire'
'to preserve'
'to order'
'to display'
'to search'
'to deliver'

'to select'
'to evaluate'
'to obtain'
'to use'
'reproduced objectifications'
'representational sign'
'physical, administrative, and cultural settings'.

4. Summary Evaluation

Library and information science can be characterized as the domain of the symbolic culture accessing system. This is a system of social practice in which access to reproduced symbolic culture is provided for users seeking that culture. The domain encompasses inquiry into such problems of social practice as: guiding access; seeking access; the nature of the transmitted symbolic culture; the system context; the system surroundings; and, the interrelations of any two or more of these phenomena.

The accessing system of social practice is a process that combines two fundamental processes. These are the process of guiding access to symbolic cultural objects and the process of seeking access to them. As such, four interrelated sets of components within their surroundings can be set forth: librarian or information consultant, user, symbolic cultural objects, and setting. Moreover, since objectives determine function in the domain of human symbolism, inquiry must set forth characterizations of the properties of these four interrelated sets of components of social practice.

The fundamental processes, the primary units, and the ways of knowing in the symbolic culture accessing system can be summarized as follows:

1. Fundamental processes of library and information practice

    1.1. Guiding access
    1.2. Seeking access

2. Primary units of library and information practice

    2.1. Librarian or information consultant
    2.2. User
    2.3. Reproduced symbolic culture
    2.4. Setting
    2.5. Society (negasystem)

3. Ways of knowing that issue from ways of inquiring

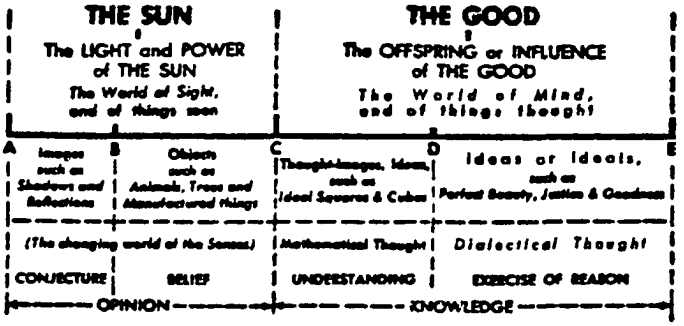
    3.1. Scientific knowledge from empirical analysis
    3.2. Philosophical knowledge from conceptual analysis
    3.3. Praxiological knowledge from empirical and conceptual analysis
    3.4. Qualitative knowledge from perceptual analysis
    3.5. Performative knowledge from transactional analysis

The characterization of the symbolic culture accessing system formulated by the present inquiry is of course an empirical theoretical definition. Beyond the determination of logical and conceptual adequacy of definitional terms and the search for counterinstances, there is no a priori way to validate the characterization. The burden of proof resides, rather, in its heuristic qualities, in the results of its use for formulating a theory of library and information science and for extending knowledge of the social practice of accessing relations. What is needed is to set forth properties of the symbolic culture accessing system, to devise empirical hypotheses of their interrelations, and to determine verificational procedures appropriate to the different kinds of problematic situations posed by uniqueness, by performance, by empirical generality, by instrumental generality, and by axiological generality. What is needed is to relate the definition of symbolic culture accessing to observations in social

reality. The defining characteristics of the system must be worked out, so that kinds of accessing components, of accessing affect relations, and of symbolic culture transmission are specified. In other words, typologies of affector roles, of affectee roles, of reproduced symbolic culture, and of settings are required.

This characterization of library and information science permits the formulation of standards for evaluating two dimensions of 'library goodness'. These dimensions are axiological ones. They concern intrinsic worth and instrumental worth.

The first dimension of library goodness is philosophical in nature: the evaluation of intrinsic worth. This is expressed in the following form: Is the symbolic culture made accessible by the accessing system taken to be 'knowledge' rather than 'opinion'? Following Plato, symbolic culture can be sorted along the "divided line" into knowledge taken as the ideal and opinion taken as imagery (The Republic, Book VI, translated by Rouse, 1956, p. 309). This demarcation has been represented in the following diagram:



LENGTH REPRESENTS DEGREE OF CLEARNESS, NOT SIZE OF CLASS.

Hence since $\frac{CE}{AC} = \frac{DE}{CD} = \frac{BC}{AB}$, it follows that BC = CD.

THE DIVIDED LINE

(p. 309)

However, the determination of whether knowledge or opinion is being made accessible by the symbolic culture accessing system is greatly complicated by the characterization of knowledge as the fund of emergent human intelligence. The problem of knowledge is the problem of the collective use and evolution of concepts, as Toulmin (1972) expressed it, or, in the words of Ziman (1968), the problem is "consensible knowledge". Knowledge taken as emergent, as truth-seeking, is permanently conjectural, and so self-enhancing; there is always more to understand, more to clarify, more to evaluate. These considerations make the determination of what is to be counted as knowledge unpredictable and uncertain, to varying degrees. This is the case at least in the short term. Thus, varying degrees of intrinsic worth of accessing systems can be taken as reflections of three factors: 1) whether the criterion of knowledge or truth-seeking is admitted at all as the way of selecting system content; 2) whether what is taken to be knowledge or truth-seeking is consistently interpreted; and, 3) the extent to which system users, individually and collectively, are permitted to specify content selection.

The second dimension of library goodness which can be evaluated by the present characterization of library and information science is praxiological in nature: the evaluation of instrumental worth. This is expressed in the following form: How effectively can the user obtain the sought symbolic culture? The extent to which access is facilitated by the system is thus indicated.

These dimensions of library goodness, intrinsic worth and instrumental effectiveness, present criteria for evaluating system

performance. They can serve to sort out constructing systems from destructing systems, and these from maintaining systems.

The present inquiry has attempted to show how general systems theory, through its extension in the SIGGS theory model, can lead to an understanding of library and information science as a system of social practice. Structural properties and functions have been delineated. As Steiner Maccia and Maccia (1971) observed:

> Understanding should lead to explanation, because understanding provides relationships or regularities which make sense of our happenings. To explain is to appeal to regularities, i.e., to appeal to theory. (p. 170)

While the objective of the present inquiry has been to formulate an adequate concept, an adequate definition, of library and information science, it must be acknowledged that even an important concept does not function as a full-fledged theory. However, as Fairthorne (1968) has pointed out:

> Any activity worth calling a discipline has three aspects: utilitarian, aesthetic, and philosophical. I will emphasize utilitarian aspects, without prejudice to the other two.
>
> The practical value of (correct) theory is that theory makes possible:
>
> 1. The solution of particular problems by application of general principles, rather than by memorization and subsequent search of an ever-growing set of unorganized problems solved by particular expedients.
> 2. Identification and stratification of functions according to the abilities required. That is, theory allows us to see who or what should do which.
>
> One cannot hope for a comprehensive, full-fledged theory all at once. Even if there were such, it would be based on theoretical foundations that were necessary, even if not sufficient, for the comprehensive theory. (p. 361)

The final chapter summarizes the present inquiry and indicates directions for future theoretical inquiry with respect to the symbolic culture accessing system of library and information science.

CHAPTER SIX

SUMMARY

From the previous chapter, it is obvious that the universe of discourse of library and information science is not already neatly defined and awaiting discovery. Discourse does not arrange itself in social reality. It must be marked off. Concepts must be formed and their adequacy examined. A system of terms to represent these concepts must be brought to the discourse in order to make sense of it. This system of terms forms a descriptive definition, a rudimentary theory.

The present inquiry has been an investigation of concept formation for the domain of library and information science. Extant definitions of the terms 'library science', 'information science', of their conjunctions, and of their conceptual antecedents have been examined and evaluated. In spite of quantitative proliferation (there are more than 1,500 of them), this inquiry has found them wanting. The conceptualizations of library science are inadequate because of their institutional binding, while the conceptualizations of information science are inadequate because of their object binding. Neither a focusing on libraries nor a focusing on information is sufficient. Moreover, the teasing apart of two domains on this basis is logically flawed; and there is no consensus in the scholarly

community on any other principle that would differentiate the one from the other. Indeed, the definitional literature reveals that there is no consensus about the proper scope of the domain, about the proper functionings of the domain, or even about its proper content.

Thus it is that in the definition of the domain or domains, there is no sense of conceptual evolution, no sense of an emerging enrichment of the fund of intelligence, no sense of consensible identity among scholars and practitioners. Rather, the sense is of conceptual inertia and intellectual confusion issuing from terminological chaos. The terminology characterizing the domain is a rhetoric of labels--the manifestation of linguistic fashion rather than an indicator of paradigmatic shift or of enhanced thinking. Changes in labels for the domain have outpaced advances in its conceptualization. Indeed, critics and analysts of domain terminology find themselves at a severe disadvantage, for they are aiming at moving targets. Thus, there are at least 340 synonymous, quasi-synonymous, and pseudo-synonymous terms set forth in the 1,516 items cited here from the definitional literature purporting to describe the principal function or functioning of the domain. At best, these can be reduced to no less than twenty-nine generic terms representing twenty-nine divergent notions of how the domain ought to be described. Moreover, these generic functions have been argued to apply variously to objects, both physical and immaterial, to persons, and to objects and persons together. The domain has been characterized as a social one, a psychological one, a biological one, a physical one, and as any combination of these dimensions.

Nowhere is weak conceptualization in the definitional

literature more apparent than in the efforts to distinguish a domain of information science from the older and more established domain of library science. It is rare to find a paper which presents definitions for both terms. The more usual course is for the author to define the favored term, to assert its separate and generally superior identity, and then to shift to some other subject matter. Every conceivable dichotomy and conjunction of domain terms has been presented and promoted in the literature.

Thus it is patent that the conceptual landscape of library and information science is cluttered with logical and conceptual fallacies. Fuzzy theorizing about the domain has resulted in conceptual obscurity, elaborate argumentation, and ill-tempered disputation about terms. A weak citing tradition has permitted inadequate conceptualizations to go unchallenged and unexamined. The definitional literature reveals little striving for universality and generalizability of the usage of terms. Terms are frequently defined "for the purpose of this study," without acknowledgement that prior related thought exists. Further, definitional claims are put forth without explicit grounds and warrant; the withholding of the reasoning from which a judgment or a conclusion issues thus prevents peer evaluation and peer acceptance. Conceptual progress is inhibited. The fund of intelligence lies dormant.

The present inquiry posits a logical and conceptual analytic approach to the definition of a domain of library and information science, of library and information study. This procedure begins with the examination and evaluation of extant uses of linguistic terms in the definitional literature. Generic terms are sorted out and a

typology of definitions is formed.

The second major phase of the logical and conceptual analytic approach to domain definition draws on exogenous logic, on a metatheory, for extending our conceptualization. The first step, as set forth in the previous chapter of this dissertation, is the recognition that the domain of interest is essentially human and social. This rules out of the discourse such problems as genetic information engineering, which is concerned with human biology in part but not with human social manifestations. The second step is the recognition that the domain is determined by marking off a unique social practice from all other social practices. Since the essence of any social practice is an organized doing, a term to signify this doing, this functioning, can be selected or formed. The next step is the recognition that the social practice of interest involves an active mediating or intervening or facilitating agent, together with an active receiving agent. This rules out of the discourse such problems as human information processing inside the brain.

Following from these logical moves, the mediating function is taken to be 'access' or 'accessing' or 'making accessible' or 'facilitating access' or 'facilitating accessibility'. Through retroductive reasoning, general systems theory as extended in the SIGGS theory model is the metatheory for proceeding to flesh out the notion of access functioning, and so to characterize more adequately the domain of library and information study. In the SIGGS theory model approach, a social practice is viewed as a kind of system. From this view, components of the system of social practice can then be deduced.

Issuing from the SIGGS theory model approach, the universe of

discourse of library and information science is taken to consist of the symbolic culture accessing system. This system identifies and maps out a particular configuration of human social practice. The configuration is the organized doing in which someone is trying to guide or facilitate access to something for someone seeking that access. There are two processes involved: guiding access, and seeking access. The someone trying to guide access is the librarian or information consultant. The seeker of access is the user. The something being sought is a selection from copies of objectified symbolic culture; 'symbolic culture' is a preferred term over 'information', for describing system content. There is also a context in which this system occurs: the context includes the physical setting such as a library building or a computer, the social setting such as middle class culture or totalitarian culture or democratic culture, and an administrative setting that includes managers, supervisors, systems analysts, computer programmers, financial and personnel officers, custodians, and general support staff. The surroundings of the symbolic culture accessing system are the larger culture, the society.

The function of access facilitation which is the librarian or information consultant's function encompasses a sequence of activities: to acquire, to preserve, to order, to display, to search, and to deliver. Not all of these functions are performed by one agent at one time.

The access seeking function of the user encompasses another sequence of activities: to search, to select, and to evaluate. User success in obtaining and using the selected symbolic culture would

issue from this sequence of activities, but would not be guaranteed by it. The symbolic culture accessing system when adequately functioning can facilitate user self-enhancement, but not ensure it.

The primary units of the accessing system of social practice can thus be specified as the following set of components, together with component interrelations:

1. the librarian or information consultant, who guides access,
2. the user, who seeks access,
3. the copies of objectified symbolic culture, which is the content of the accessing system,
4. the setting, which encompasses physical, social, and administrative contexts in which system content is made accessible and sought.

Delineation of system surroundings, the society from which the selection of symbolic culture is taken, completes the mapping of the universe of discourse of library and information science.

Inquiry with respect to the symbolic culture accessing system is marked off by the problems of its social practice. Thus, not every inquiry effort counts as part of the domain of library and information science. Investigating the structure of computers does not. Investigating the structure of the literature about computers does so count. Thus, the inquirer qua inquirer of library and information science functions to formulate and solve problems about the culture accessing system, about the social practice of facilitating and seeking access to objectified symbolic culture. Practitioners seek sense in order to control the states of affairs associated with the function

of access facilitation. Questions must be addressed with respect to the general or unique properties of librarian, user, symbolic culture, setting, or surroundings, and the relations among these properties.

Since problems are not all of a kind, however, more than one way of inquiring and so of knowing about culture accessing system questions is possible. Not all problems are empirical, for example, and so value inquiry can be sorted out from scientific inquiry. Not all problems are quantitative, either, and so qualitative inquiry can be sorted out. Thus, perceptual analysis of pervasiveness or uniqueness produces qualitative knowledge of components of the domain. Transactional analysis of actions or performances produces performative knowledge of functions of the domain. Conceptual analysis of intrinsic values or intrinsic judgments produces philosophical knowledge of components of the domain. Conceptual and empirical analysis of means-ends or instrumental relations produces praxiological knowledge of components of the domain. Empirical analysis of phenomena produces scientific knowledge of components of the domain. Moreover, if the problem concerns what to do, then development inquiry must be undertaken, so that knowledge is linked to the conditions of unique time and unique place.

These dimensions of problem situations require that the domain of the symbolic culture accessing system be characterized more broadly than the empirical, so that the notion of library and information science must be taken broadly as a 'study'.

The characterization in the present inquiry of the domain of symbolic culture accessing constitutes an empirical theoretical

characterization. A scientific definition is advanced. What is needed in addition is inquiry into the problem of formulating theoretical hypotheses and their deductive relations, so that subsequent empirical research can be conducted. The definition of the system must be related to observations in social experience. Basic postulates and empirical hypotheses must be devised and tested out in the reality of practice. Typologies of system components must be set forth, so that kinds of librarian roles, kinds of user roles, kinds of symbolic culture, and kinds of setting can be developed and so that their interrelations with each other and with their surroundings can be described.

Moreover, kinds of symbolic culture accessing systems must then be characterized, so that criteria for constructing effective systems can be known. Problems of effectiveness concern two dimensions, the intrinsic and the instrumental. The intrinsic dimension is the philosophical problem of content evaluation: Is the selected symbolic culture knowledge, not opinion? The instrumental dimension is the praxiological problem of user relevance evaluation: How effectively can the user obtain the wanted symbolic culture? Thus, questions about the goodness of culture accessing systems can be addressed. Enhancing systems can be sorted out from destructing systems, and these from maintaining systems.

In addition, further logical and conceptual inquiry is needed in order to relate the symbolic culture accessing system to other domains of social practice. In particular, the domains of archives administration, records management, rare books libraries, business information systems, computer science, communication science,

journalism, and mass communications need to be examined and compared to the domain of library and information science as formulated here.

The present inquiry has attempted to show how general systems theory through its extension in the SIGGS metatheory can lead to an enhanced understanding of library and information science as a system of social practice. While the objective has been to formulate an adequate conceptualization of the domain, such a definitional statement does not function as a full theoretical framework for solving domain problems. It is, however, a logical beginning.

APPENDIX I

ADDITIONAL DEFINITIONS ABOUT LIBRARY SCIENCE

5. Definitions about Objects

5.1. Definitions about Objects: To make accessible

Johnson, 1915:

> The main function of the special library is to make information available. The stock-in-trade . . . of the special library is much oftener represented by pamphlets, manuscripts, clippings, and filing case material; while the most important part of its equipment may not be printed matter at all, but human brains. (p. 159)

Williamson, 1915:

> A special library is an efficient, up-to-date, reasonable, complete collection of the literature on a particular subject, including not only books, but clippings, pamphlets, articles, reports, etc., all so completely indexed and classified that the latest and best data are available without the difficulties and delays that are more or less inevitable in a large general library. (p. 158 in Johnson, 1915)

International Federation of Library Associations, 1963:

> [Fully] recognising the actual differences, libraries do form one large world and for all librarians there is a common basis. On a different level, or rather in different ways, they all work together to attain one and the same object: the spreading of knowledge, no matter whether this is done by way of a book, a periodical, a microcopy or a gramophone record. In the acquisitioning and arranging of material and making it available there is so much that is common to all libraries that, on that account as well, librarians feel themselves soldiers of one army, however varying this may be in its divisions. (pp. 39-40)

Slamecka and Taube, 1964:

> Since known order is a prerequisite of access, organization may rightly be called a primary foundation of librarianship; without it, the profession would be without a rationale. The main object of organization in librarianship is "information"--the content of physical materials; . . . For unless it is accepted that information is the proper object of library organization, with the physical item being a corollary of it, librarianship practically abrogates the interpretive function of its service. (p. 67)

Clapp, 1965:

> This report of research on concepts and problems of "Libraries of the Future" records the result of a two-year inquiry into the applicability of some of the newer techniques for handling information to what goes at present by the name of library work--i.e., the operations connected with assembling information in recorded form and of organizing and making it available for use. (p. v)

Benge, 1970:

> The available definitions of librarianship all include four main areas of activity. They indicate that librarians are responsible for:
>
> 1 The collection of material appropriate for libraries.
>
> 2 The preservation of the material.
>
> 3 The organisation of the collections.
>
> 4 The dissemination of the material or the information which it contains. This may include interpretation.
>
> Preservation and organisation (2 and 3) are often treated as one, so that the function has been expressed simply as acquisition, management and use of appropriate material. This is convenient, but the word 'use' is not accurate, and what is required is something to indicate 'making available'. . . . librarianship is both a science and an art. (pp. 222, 231)

Johnson, 1970:

> . . . man has devised a means of arranging, preserving and using them [graphic records]. Once arranged, preserved, and used, they become libraries. . . . As the number of these laws, records, and rituals grew beyond a few score, it became necessary to organize them for easy use, to preserve them in a permanent location, and to designate one or more persons to be responsible for their arrangement, preservation and availability. But once they had been so arranged and preserved, they became a durable part of the cultural heritage, a stepping stone to further progress. (pp. 487, 488)

Resnikoff, 1971:

> [Contract] principal objectives are the development of a model for information access and storage systems, and the study of the structure of existing access systems with the intent of augmenting them in significantly useful ways by means of automated processing of machinable data bases.
>
> The concern which underlies this and many other projects is that the rapidly growing body of information stored in library archives is overwhelming the traditional means of obtaining access to it in a reliable, timely, and comprehensive manner. (p. 2)

Johnson, 1973:

> Whatever forms the recorded knowledge of the future may take, there will always be the problem of preserving it, storing it, organizing it, and making it available for future use. Whether it will be the librarian, the information scientist, or the members of some yet un-named profession, the "keepers of the books" will always be needed. (p. 288)

Daniel, 1974:

> To summarize, the role of the librarian is not one, clearly defined, simple delineation of duties, but a complex of activities associated with acquiring, housing, displaying, and making available a diversity of information resources to achieve an infinite number of ends. . . . (p. 565)

5.2. Definitions about Objects: To retrieve

Nil additional.

5.3. Definitions about Objects: To transfer

Line, 1965:

> [The directly functional ends of books and libraries are] as purveyors of information and entertainment. . . . (p. 270)

Emery, 1971:

> [The] librarian performs secondary tasks, related more to the communication of knowledge than its application or creation. (p. 128)
>
> . . . .
>
> The functions of librarianship, means to the ends of library purposes, are normally thought of as being recognition, collection, organization, preservation and dissemination of materials. (p. 129)

McGarry, 1975:

> [Librarianship is defined as] an activity concerned with the acquisition, organization and dissemination of recorded knowledge. . . . (p. 8)

Wersig and Neveling, 1976:

> Library science. The branch of learning concerned with collecting, storing and distributing written or printed records by means of libraries, and of the management of libraries. (p. 54)
> . . . . .
> Librarianship. The application of knowledge of books and certain principles, theories and techniques to the establishment, preservation, organization and use of collections of books and other materials in libraries and to the extension of library service. (p. 99)

Orr, 1977a:

> Libraries are communication systems, analogous to the human memory. They store, retrieve and disseminate information, knowledge and data. . . . [It] is probable that the most difficult function of the library is that of retrieval, and there is much to be said for making this the focus for all studies <u>in</u> librarianship.
> . . . .
> [Keeping] firmly in mind that the basis of the curriculum is to provide an education for the librarian . . . [it] therefore follows that the bulk of studies must be within librarianship and information studies. (p. 59)

5.4. Definitions about Objects: To process

Giuliano, 1969:

> I would like to see the field of librarianship defined in terms of the knowledge transfer function, rather than in terms of the library institution.
> . . . .
> The knowledge transfer function encompasses those procedures necessary and appropriate for the assembling of knowledge, its systematic organization, its restructuring and representation, its storage, its retrieval and dissemination. (p. 344)

5.5. Definitions about Objects: To use or make useful

American Library Association, 1943:

> Library Science. The knowledge and skill by which printed or written records are recognized, collected, organized, and utilized. (p. 82)
> . . . .
> Librarianship. The application of knowledge of books and certain principles, theories, and techniques to the establishment, preservation, organization, and use of collections of books and other materials in libraries, and to the extension of library service.

Grasberger, 1954:

> The library . . . task of collecting, classifying, preserving, and rendering useful scientific and literary materials has remained essentially unchanged. (p. 391)

Landau, 1958:

> Librarianship. The characteristics and functions of a librarian, as 'scholarship' represents the characteristics of a scholar. Librarianship has been defined as the collection, preservation, organization and use of recorded communications. (p. 171)

Knox, 1965:

> While for some cultures and some disciplines the traditional storehouse-of-knowledge concept may be valid, I believe that today and in the future, libraries must dedicate themselves to the active exploitation of recorded knowledge and must pay relatively less attention to the acquisition and storage of information and more to those parts of the service which will promote the active use of information. (p. 722)

Gates, 1968:

> Library science may be defined in simple terms as the body of organized knowledge--in whatever form--which is concerned with the purposes, objectives, and functions of libraries and the principles, theories, methods, organization, and techniques employed in performing library service. Librarianship may be defined as the application of this knowledge in the collection, organization, preservation, and use of books and other materials in libraries and in the continuous improvement and extension of library service. (p. 133)

Thomas and East, 1968:

> A 'library system' in fact consists of a hierarchy of systems and we have decided to use the term 'sub-system' to denote operations within the larger complex. . . . [An] office can be defined as having the five following 'functions':
>
> Receiving
> Recording
> Arranging Information
> Giving
> Safeguarding Assets.
>
> . . . .
>
> There is, however, one important function of a library that is omitted from the . . . list, that of obtaining information. (p. 341)
>
> . . . .
>
> At the next level of systems organization we have defined a group of nineteen procedures which make up the various sub-systems. The procedures have been given the following names:

Sub-system	*Procedure*
Acquisition	select order receive
Processing	accession catalogue classify label list shelve
Use	locate lend reserve recall borrow return photocopy
Maintenance	bind replace discard

(p. 342)

Smith, 1973a:

> [The librarian's role is] the collection, arrangement and exploitation of (mainly printed) information, . . . (p. 240)

5.6. Definitions about Objects: To keep or manage

Perkins, 1876:

To begin with, businesslike management [of town libraries] is the whole story. (p. 419 in *Public Libraries*, 1876)

School of Library Economy, Columbia College Library, 1884:

> The School of Library Economy interprets Library Economy in its broadest sense, as including all the special training needed to select, buy, arrange, catalogue, index, and administer in the best and most economical way any collection of books, pamphlets, or serials. (fn 32, p. 91 in White, 1976)

Dewey, 1887:

> . . . bibliografy will receive as full treatment as library economy and perhaps justify a change of name from the limited Library Economy to the generic name Library Science, covering bibliografy, cataloging, classification and the group of topics connected with library management known as library economy. (p. 80 in White, 1976)

New York State Library School, Albany, 1891:

> Library science is interpreted in its broadest sense as including all the special training needed to select, buy, arrange, catalogue, index, and administer any library in the best and most economical way. (p. 81 in White, 1976)

Hitchler, 1909:

> Librarianship. The position and duties of a librarian.
> . . . .
> Librarian. One who has charge of the books, contents and administration of a library.
>
> . . . .
> Library science. The science relating to the administration of libraries: library economy and bibliography.
> . . . .
> Library economy. The practical application of library science to the founding, organizing and administration of libraries. (p. 53)
> . . . .
> Bibliography. The science which embraces the history and description of books, treats of their authors, subjects, typography, editions, materials, etc. Also used to mean a list of the books or authorities on any particular subject, as, a bibliography of architecture. (p. 41)

Dana, 1915:

> Special libraries are the first and as yet the only print-administering institutions which . . . frankly adopt the new library creed as to print management, of careful selection, immediate use, and ready rejection when usefulness is past. (p. 158 in Johnson, 1915)

Fitzpatrick, 1915:

> [The special library is] a collection of reliable, important and adequate records, being interpreted as anything which contains information; a book, a clipping, a tabulation, a model. (p. 158 in Johnson, 1915)

Hitchler, 1915:

> Librarianship. The position and duties of a librarian.
> . . . .
> Librarian. One who has charge of the books, contents and administration of a library. (p. 300)
> . . . .
> Library Science. The science relating to the administration of libraries: library economy and bibliography. (p. 301)
> . . . .
> Library Economy. The practical application of library science to the founding, organizing and administration of libraries.
>
> . . . .
> Library Organization. Library organization must of necessity precede library administration. . . . Organization creates the machine; Administration runs it. (p. 300)
> . . . .
> Bibliography. The science which embraces the history and description of books, treats of their authors, subjects, typography, editions, materials, etc. Also used to mean a list of the books or authorities on any particular subject, as a bibliography of architecture or a list of books of a particular author, printer, place, or period. (p. 289)

Moth, 1915:

> Library economy or library science. The science which deals in the widest sense with the organization and management of libraries. The term "library economy" is generally preferred. (p. 15)

Bostwick, 1920:

> One of the functions of the modern library is that of a huge cyclopedia. . . . It is the cyclopedia on cards long advocated by Dr. [Melvil] Dewey, except that the cards are in its catalogue and do not contain the information directly but serve only as keys to it. (p. 379)

Williamson, 1923:

> To the library school of a graduate and truly professional character we should look for the workers needed to fill all positions requiring extensive and accurate book knowledge, skill in organization and administration, and expert technical knowledge in many special lines. (p. 7)
> . . . .
> Until library work is so organized that professional workers devote all their time and energy to professional tasks--tasks which workers with less adequate general and technical equipment cannot perform without permanent damage to library service--it is not worth while to expect librarians to be paid on a professional basis. (p. 9)

Williamson, 1931:

> True it is that to a large extent library science is an applied science, but so are education and engineering and agriculture.
> . . . .
>
> I think there is in their development a very close parallel between library science and the science of education. Twenty or twenty-five years ago education stood where library service stands today. (p. 10)

Board of Education for Librarianship, American Library Association, 1933:

> [The] various aspects of librarianship [are]: functions and administration of libraries, bibliography and technical processes. (p. 611)

Harrod, 1938:

> Librarianship. The profession of librarian.
> . . . .
> Librarian. One who has charge of the books, contents, and administration of a library. (p. 93)
>
> . . . .
>
> Library Science. The science relating to the administration of libraries; library economy and bibliography. (p. 96)
> . . . .

Library Economy. The practical application of library science to the founding, organizing and administration of libraries (p. 94)

. . . .

Library Organization. Library organization must obviously precede library administration. . . . Organization creates the machine; administration runs it. (pp. 95-96)

. . . .

Bibliography. 1. In relation to cataloguing, a list of books and sometimes of other material too, such as articles and illustrations, by an author, on a subject, printed by one printer, in one place, or during one period: the literature of a subject. . . . 2. The art or science of correctly describing books (their literary contents, physical make up). Loosely, the science of books. The science of making books. 3. The science of books, which can be divided into: Historical, dealing with the history of book production; Bibliothecal, concerned with the collection, preservation, and organization of books in libraries; . . . 4. The study of lists of literature (Schneider). 5. The art of recording books. The science of the making of books and of their extant record. (Esdaile). 6. A list of books arranged according to some permanent principle (Besterman).

. . . .

Bibliology. The theory of bibliography, dealing with the construction of books from the beginnings to the present day, including paper and other materials, typography, illustration and binding. (p. 22)

MacLeish, 1940:

> Keepers of books, keepers of print and paper on the shelves, librarians are keepers also of the records of the human spirit--the records of men's watch upon the world and upon themselves. (p. 20)

American Library Association, 1943:

Bibliology. The science of books, embracing knowledge of the physical book in all its aspects, as printing, bookbinding, bookselling, libraries, and library science. Bibliography in its widest sense. (pp. 11-12)

. . . .

Bibliography. 1. The study of the material form of books, with comparison of variations in issues and copies, as a means of determining the history and transmission of texts. 2. The art of describing books correctly with respect to authorship, editions, physical form, etc. 3. The preparation of lists of books, maps, etc. 4. A list of books, maps, etc., differing from a catalog in not being necessarily a list of materials in a collection, a library, or a group of libraries. (p. 11)

. . . .

Library Science. The knowledge and skill by which printed or written records are recognized, collected, organized, and utilized. (p. 82)

. . . .

Library Economy. The practical application of library science to the founding, organizing, and administration of libraries. (p. 81)

. . . .

Library Administration. The active management of a library, including the formation and carrying out of policies and plans.

. . . .

Librarianship. The application of knowledge of books and certain principles, theories, and techniques to the establishment, preservation, organization, and use of collections of books and other materials in libraries, and to the extension of library service.

. . . .

Librarian. 1. A person responsible for the administration of a library. . . . (p. 80)

Kunze, 1961:

The content of library science is the library. (p. 20 in Molnar, 1968)

Slamecka and Taube, 1964:

Since known order is a prerequisite of access, organization may rightly be called a primary foundation of librarianship; without it, the profession would be without a rationale. The main object of organization in librarianship is "information"--the content of physical materials; . . . For unless it is accepted that information is the proper object of library organization, with the physical item being a corollary of it, librarianship practically abrogates the interpretive function of its service. (p. 67)

Landau, 1966:

[Librarians are] administrators of human record. . . . (p. 246)

Daniel, 1974:

[The librarian's] functions seem to have had an additive quality so that the role of the librarian today has increased in complexity since its inception. Today's librarian may be called upon to be bibliographer, educator, administrator, information specialist, collector and conservator sometimes consecutively, often conjointly. (p. 564)

. . . .

> To summarize, the role of the librarian is not one, clearly defined, simple delineation of duties, but a complex of activities associated with acquiring, housing, displaying, and making available a diversity of information resources to achieve an infinite number of ends. . . . (p. 565)

British Standards Institution, 1976:

> Librarianship. The collection, conservation and organization for use, of documents in the library, and the theoretical and practical studies of such procedures.
>
> . . . .
>
> Librarian. One occupied in the collection, conservation, and organization of documents for use; also in the exploitation of documents and information in a library and from other sources. (p. 38)

5.7. Definitions about Objects: To describe books

Khurshid, 1976:

> . . . critical bibliography has long been a distinct intellectual discipline in this field. Rather, scholarship in librarianship had its root in this singular work of immense research value to literature and learning. Enumerative bibliography based on authentication of documents, as in critical bibliography, is again the most solid scientific research work in the field of librarianship. . . . the foundation of librarianship itself rests on book culture. . . . (pp. 18-19)

5.8. Definitions about Objects: To regulate book production

Nil additional.

5.9. Definitions about Objects: To protect books

Nil additional.

6. Dfinitions about People

6.1. Definitions about People: To teach

Mathews, 1876:

> The value of books as a means of culture is at this day recognized by all men. The chief allies and instruments of teachers, they are the best substitutes for teachers, and, next to a good college, a good library may well be chosen as a means of education. Indeed, a book is a voiceless teacher, and a great library is a virtual university. . . . What, indeed, is college education but the reading of certain books which the common sense of all scholars agrees will represent the science already accumulated? (pp. 240, 241 in *Public Libraries*, 1876)

Poole, 1876:

> [The public library] is the adjunct and supplement of the common school system. Both are established and maintained on the same principles--that general education is essential to the highest welfare of any people; and, considered simply as a question of political economy, it is better and cheaper, in the long run, to educate a community than to support prisons and reformatories. (p. 477 in *Public Libraries*, 1876)

Quincy, 1876:

> But the moment the public school is supplemented by a public library, its capacity is increased an hundredfold. . . . It is fast becoming the work of the schools of our governing majority to fit for the people's college, the town library. . . . When Thomas Hobbes declared that democracy was only another name for an aristocracy of orators, he never conceived of a democracy which should be molded by the daily journal and the free library. To this latter agency we may hopefully look for the gradual deliverance of the people from the wiles of the rhetorician and stump orator, . . . As the varied intelligence which books can supply shall be more and more wisely assimilated, the essential elements of every political and social question may be confidently submitted to that instructed common sense upon which the founders of our Government relied. Let us study to perfect the workings of this crowning department in our apparatus for popular education. (pp. 400, 402 in *Public Libraries*, 1876)

Robinson, 1876:

> . . . consider whether there is not a demand for regular and systematic instruction in the use of the library.
>
> First. A brief course of lectures on books; how to get

them, how to keep them, and how to use them, would come from a scholarly librarian in a systematic way with much better effect than in desultory talks from the heads of different departments. It is in his power to know the reading habits of students much better than any one else. . . . Now, why not let the librarian follow up his systematic instruction by constant personal examination, which is the most successful of all teaching? Let this be understood, by officers and students alike, as part of his regular duties. Let students feel individually under his direction and influence in their reading and investigation, and let him also be held in some degree responsible for their success in this work. (p. 521 in *Public Libraries*, 1876)

Warren and Clark, 1876:

> The influence of the librarian as an educator is rarely estimated by outside observers, and probably seldom fully realized even by himself. . . . While this [a professorship of books and reading to teach students what and how to read] would meet the needs of college students, the much larger constituency of the public libraries would still remain, as now, generally dependent on the librarians for advice and direction. Hence, it is clear that the librarian must soon be called upon to assume a distinct position, as something more than a mere custodian of books, and the scientific scope and value of his office be recognized and estimated in a becoming manner. (pp. ix, xxiii in *Public Libraries*, 1876)

Dewey, 1886:

> No more can the triangle of great educational work now well begun be complete without the church as a basis, the school as one side, the library the other. (p. 102)
> . . . .
> The old library was passive, asleep, a reservoir or cistern, getting in but not giving out, an arsenal in time of peace; the librarian a sentinel before the doors, a jailer to guard against the escape of the unfortunates under his care. The new library is active, an aggressive, educating force in the community, a living fountain of good influences, an army in the field with all guns limbered; and the librarian occupies a field of active usefulness second to none. (p. 103)
> . . . .
>
> I have spoken thus far of the missionary and popular side of libraries, but there is another side as distinct as is the university from the common school. To some of you this scholarly work will be more attractive than the popular. The library is the real university of the future, not simply for the people but for scholars. (p. 107)

Dewey, 1898:

> The library is no longer merely a passive receptacle, but becomes an aggressive educational force in every community . . . . the State must recognize that education is not alone for the young . . . but all through life. . . . I may sum it up in the one sentence, "Higher education, for adults, at home, through life."
>
> In this home education, which must hereafter be recognized side by side with school education, the library is the great central agent round which study clubs, reading circles, extension teaching, museums, and the other allied agencies must cluster. . . . It is what a man reads that shapes his future. . . . In education we recognize that the supreme end is the building of character, but many of us have never thought clearly how directly this character-building rests upon the public library. It is reading that begets reflection, reflection begets motive, motive begets action, and action begets habit, and habit begets character. . . . "Knowledge is power," and it is knowledge that has made England and American great. . . . Can the State afford to make other things free, and not make free true and useful knowledge as preserved in books? Can the State recognize the necessity for free schools, and fail to provide free access to the best reading in all realms of knowledge? . . . If the issue came . . . between giving up either the library or the free school, I am not sure that I would not choose for the welfare of the country the public library rather than the schoool. This may sound strange from one who has given his life to education, but I believe that even without our schools nearly every boy and girl would somehow learn to read; . . . (pp. 2, 5, 6-7)

Dewey, 1899:

> It took a thousand years to develop our educational system from the university down . . . and it is only in our own generation that we have come to understand that we must begin with the kindergarten and end in our libraries. (p. 75)
>
> . . . .
>
> A broad conception at the end of the century of the work of the schools is simply this, to teach the children to think accurately, with strength and with speed. If it is in the school that they get their start, then where do they get their education? (p. 76)

Johnston, 1910:

> We have often discussed the work of the librarian as an assistant to the teacher, but we have not discussed the work of the teacher as an assistant to the librarian. (p. 437)
>
> . . . .
>
> (1) what educational functions may be transferred from the school to the library? and (2) how may the library help to carry on the work of instruction into years of maturity?
>
> . . . .

> The slogan of this education movement . . . is *individual instruction*. . . . It makes the individual and not the class the unit of instruction.
>
> . . . .
>
> The demand for individual instruction is therefore one which can be met and should be met by the schools only to a limited extent. The place for it is in such educational institutions as the library, the museum, the shop, the garden, the playground, etc. Individuals require not so much an opportunity to be taught as an opportunity to learn. (p. 438)
>
> . . . .
>
> I am convinced, therefore, that the greater part of reading, together with other subjects which are essentially subjects for reading, should be transferred from the school room to the library.
>
> With the transfer of these subjects from the school to the library, however, they should not cease to be regarded as means of educational discipline. They should be still looked upon by educational authorities as established courses of study. They should be regulated as school studies are and students pursuing them should, if they so desire, receive proper credit for the same.
>
> . . . .
>
> It sometimes seems to me that public libraries may come to occupy the place in this country which the university occupies in Germany, but if they do they must not become the centers of a literary proletariat as the university has in that country, but the centers of a library aristocracy. Specialization of collections and specialization in service . . . will enable the library to develop its service as an educational institution and the librarian to realize his functions as an educator. (p. 441)

Henry, 1917:

> [The school's] elementary mission is to teach us how to read. (p. 78)
>
> . . . .
>
> . . . there is a larger, more extended and more varied educational need than any or all other professions can reach. We believe that in this new field the education may be largely self-directed, indefinitely prolonged and largely the choice of the individual concerned; a large opportunity, equally free and open to all, yet under intelligent and expert direction--a social service but with the highest degree of individuality. (p. 79)
>
> . . . .
>
> The library is the instrument and the librarian is the social agent which bring the past to the present in preparation for the future, and through these the individual is self-educated for social ends. (p. 80)
>
> . . . .
>
> The professional men and women must everywhere and always be the guardian, guides, advisers, and directors of the people. (p. 81)

Ranganathan, 1931:

> But the vital principle of the library . . . is that it is an instrument of universal education, and assembles together and freely distributes all the tools of education and disseminates knowledge with their aid. (p. 354 in Ranganathan, 1957)

Thompson, 1931:

> What is the most important, basic qualification for librarianship? Dr. Waples thinks that nobody will deny that librarianship is "primarily a social enterprise." But everything is social;and I think it is more accurate and more salutary to consider it as primarily an educational enterprise, . . . More specifically, for education is a broad word, our purpose is what Mr. Jewett described in 1853 as "the diffusion of a knowledge of good books, and enlarging the means of public access to them." (p. 582)

Williamson, 1931:

> If the library is to rise to its opportunity as a social institution and educational force . . . . (p. 3)

Carnell, 1934:

> What is this purpose for which we are demanding people who are more than clerks with library experience? It is to make and maintain out of the service we possess a greater service which shall be in fact as well as misty ideal a University of the People.
>
> . . . .
>
> "Democracy," someone has said, "must be self-educated as well as self-governed." Therein lies the difference between the library and the school, the librarian and the teacher. Our role is not that of teacher, but the humbler one of guide.
>
> . . . .
>
> At the "University of the People" learning must be correlated with living. . . . The translation of this idea into action can only be done by librarians who are lively as well as learned, by men and women who are in touch with life in all its aspects, who see it, so far as it is possible for the mind of man to do so, as an organic whole. (p. 42)

Wilson, 1936:

> I expect to see the library . . . go consciously educational in the broad sense and take those steps in the readjustment of its organization, equipment, and personnel which will enable it to meet the educational needs of groups as well as of individuals and to serve society in a fundamentally educational way. (p. 256)

Lancour, 1951a:

> [Librarianship] is now in the third of three rather clearly marked stages of development. While these stages are roughly chronological they are not necessarily so. They more exactly represent varying philosophies of librarianship.
>
> . . . .
>
> The first of these stages may be described as the storehouse period of librarianship. . . . The job of the librarian was comprehensively to collect and carefully to preserve.
>
> . . . .
>
> The second stage of library development may be called the service period of librarianship. Librarians came to realize that securing and storing was not enough. Every effort was made to see that the materials were effectively used.
>
> . . . .
>
> Now, we believe, librarianship has moved into a third stage, in which the emphasis is placed on the educational function of the library. (p. 280)
>
> . . . .
>
> [The fundamental objective of the library[is the creation of a broad and positive form of education, designed for the recognized potential users of the library and which makes use of the materials and services peculiar to the library. In this form of librarianship, the librarian is concerned not only with getting the book to the reader but he is equally, if not more, concerned with the effects that book is going to have upon that reader. (p. 281)

Butler, 1953:

> Books are short cuts to learning because they are substitutes for experience, thought, and memory. (p. 156)

Asheim, 1954:

> Functions of the library in society.
>
> . . . .
>
> D. To serve as an integral part of formal education.
> E. To serve as an instrument of enlightenment and informal education.
> F. To contribute to the awaking, inspiration and development of the individual. (p. 16)

Powell, 1954:

> The ideal librarian will regard books as teachers *par excellence*, remembering, for example, how they rather than any school or university taught the young Lincoln.
>
> . . . .
>
> Thus our ideal librarian will be a bookman-administrator-educator, . . . (p. 164)

Knapp, 1955:

> Second, because the [college] library is desinged to implement directly the educational process, he [the head librarian] is, in a sense, an educator. (p. 57)

Landau, 1958:

> Broadly there are three possible purposes of a library: teaching, research and entertainment; . . . (p. 173)

Gregory, 1959:

> The library (*sic*) should have a missionary zeal for informal education. He should realize that comparatively few people break through the barriers of those difficulties that confront the reader of thoughtful books. . . . The adult mind confronts a challenging task before maturation in order to acquire emotional and intellectual independence. Nobody grows up without some baneful habits which early conditioning imposes upon us. In order to break emotional and intellectual chains independent and vigorous thinking is imperative. The sources of such independence can be found easily in the experience of exceptional people in varying degrees throughout written history, transmitted to us through the written records of mankind. We librarians are the guardians of these written records. (p. 47)

Whitenack, 1963:

> As librarians it is our duty to strengthen and clarify the sacred values of our society. At heart the librarian is a missionary. As Dr. Mason Gross so succinctly stated in his opening address at the 1963 ALA conference: "Libraries must preserve moral, ethical, subjective or romantic values for society in the collections we assemble and in the services we give. We can help a great deal to develop democratic human relationships among all Americans." (p. 18)

Kaplan, 1964:

> The library is a means of education, an instrumentality by which special groups and classes in the society can take advantage of experiences not directly their own, and so improve their position in society . . . [and become] integrated into the American culture . . . . (p. 9)

Mukherjee, 1966:

> The principal function of the library, however, is to serve the cause of education, . . . (p. 12)

Shores, 1969:

> And for the solution of these three problems [impersonality in teacher-student relations, the lockstep in learning mode, and authoritarianism in curriculum] I now present to you the concept of Library-College USA. (p. 1548)
> . . . .
> Independent study by the student is the essence of the Library-College learning mode.
> . . . .
> All the professor can do in preparation for independent study is, as Carlyle wrote over a century ago, teach the student how to read intelligently. . . .
> However, by reading, we of the Library-College mean more than just reading the printed page in hard covers. . . . As I defined the generic book in my *Saturday Review* editorial for the first National Library Week, it is *the sum total of man's communication possibilities.* This generic book in all of its formats, levels, and subjects, represents the only evidence of life. (p. 1549)
> . . . .
> So the Library-College becomes first of all a true university as Carlyle defined it: a collection of books that comprise a selection of the generic book. (p. 1550)

Christ, 1972:

> Librarianship, or library science, is considered by this writer to be the scientific acquisition, retention, classification, and referral of learning materials required for the preservation and development of knowledge by human subjects in a particular ecological setting.
> As can be seen from this definition, the theoretical structure underpinning the functional and operational structure of library science is the concept of education. . . . the librarian is concerned with learning materials used in the library. . . . Within an educational framework library science is concerned with the educational enterprise and the relationship of learning resources to formalized teaching. As such, library science may be considered as an academic discipline. In addition, because library science is concerned with human behavior it may be considered as one of the behavioral and social science discplines. Also, because library science is concerned with the growth, preservation, and use of knowledge in recorded form it is one of the sub-fields (hybrids) of education. The most basic fundamental unit of analysis in academic or educational librarianship concerns knowledge as it is recorded and used in learning. (pp. 72-73)
> . . . .
> As has been stated earlier, education is the basic fundamental purpose of the library. (p. 75)
> . . . .

> . . . the library is an educational center which deals not only with recorded forms of knowledge but with knowledge itself, because the use of knowledge materials is in itself a knowing-learning activity. The use of recorded materials of knowledge is more than some kind of communications activity devoid of epistemological consideration. The process of using recorded knowledge is an educational activity.
>
> . . . .
>
> The library is an independent educational environment where the student is largely on his own, referring on occasion to the advice and counsel of a librarian or professor. (p. 80)
>
> . . . .
>
> Just as there are cognitive, psychological, conceptual, and intellectual abilities or skills associated with classroom study, so also there are the same kinds of abilities--intellectual abilities--associated with the knowledge of and use of libraries. As an independent educational environment the library has a direct relationship to learning theory. (p. 81)
>
> . . . .
>
> The library is a complete research environment. It is because of this factor and because of the library's direct relation to previous knowledge (through recorded materials) and to contemporary knowledge (in the questions being asked which require the use of that knowledge) that the library is essentially part of the institution of education. (p. 82)

Churchman, 1972:

> Libraries are not separate systems. They are, indeed, a part of the health-education-research system. . . . Libraries are a part of the educational system in the sense that the libraries of the future in a world of universal education will be totally unlike the libraries of today. The technology of such future libraries is to satisfy the need to know, . . . (p. 13)

Shukla, 1974:

1. Library is a social educational institution for the self development of man, through an organised collection, systematic communication and planned extension of knowledge.
2. Library: An institution for the cultural deposit, perpetual education, creation of political consciousness of the man, enrichment of . . . individuals and the development of the research potentialities of intellectuals of a nation which may lead to greater assimilation and extension of the boundaries of the human knowledge for the ultimate better and peaceful living of man. . . . (pp. 8-9)

Rugaas, 1977:

> Basically, librarians are engaged in the same activity as teachers: they are communicating knowledge. The methods employed may vary greatly, and the work done may be differently labelled in consequence, in essence it all amounts to organizing information. It covers all aspects of life, . . . (p. 152)

6.2. Definitions about People: To enlighten or inform

Green, 1896:

> I verily believe that not least among the instrumentalities by which thought may be matured and knowledge completed are public libraries when administered as bureaus of information by accomplished and earnest librarians, who will act as sympathetic friends and advisers to inquirers and help them to look at all sides of questions and form well-grounded judgments. (p. 386)

Dewey, 1899:

> So the province of the library is to amuse, to inform and inspire. (p. 77)

Josephson, 1900:

> The library is part of and ought to be the center of the intellectual life of the community, and needs as its head an intellectual leader. No matter how small it is it will always have among its readers some who come for other purposes than entertainment, and they will naturally look to the librarian for information as to the resources of literature and the methods of study and investigation. (p. 226)

Dana, 1906:

> . . . libraries should serve as incentives and stimulants; . . . to increase the interest their constituents take in the world they live in, to the end that those constituents, the people, may find that the library they have set up has helped them to become broader, more generous-minded, better balanced and more able and willing to work for the common welfare. . . . The library should be a mental irritant in the community; it should help to make the old fresh, the strange tolerable, the new questionable, and all things wonderful. (pp. 10-11)
> . . . .
> [The public library] adds to social efficiency not by teaching directly how effectively to organize and cooperate, but by promoting sympathy. It exposes to many the similarities between

> manners, ideals, and aims which seem at first quite dissimilar. . . . Then we applaud, we sympathize, we cooperate--and peace is here. (pp. 11-12)
>
> . . . .
>
> The school can compel to knowledge; the library must allure to knowledge. The schools are for educible young; the libraries are for persuadable old. (p. 12)
>
> . . . .
>
> But the library may also awaken interest and stimulate inquiry; . . . (p. 13)

Foss, 1909:

> . . . the librarian ought to meekly and modestly assume the intellectual leadership in his community. He is certainly the logical man for the intellectual leader. He is the custodian of the intellectual treasures of his town; he is the adviser of its scholars, the teacher of its teachers and the keeper of the keys of the vaults of knowledge. (p. 38)

Putnam, 1915:

> You can aid it [the present age] to exact knowledge, clear and discriminate thinking, and the choice of the better reason. That is the prime office of books and of libraries. (p. 49)

Butler, 1933:

> It has therefore seemed necessary to speak of the use of books only as a process of "learning by reading." (p. 30)
>
> • • • •
>
> Cumulative knowledge has far outrun the content of the scholastic curriculum. There was a time when the two were almost identical. The scope of education must now be correspondingly enlarged to embrace the whole process whereby an indvidual member of society draws upon the compounded communal store of intellectual capital. In this the library takes on a new significance and becomes only less important than the school. (p. 43)
>
> . . . .
>
> The process of learning is the same whether it is performed through voluntary reading or under the compulsions of a school discipline. (pp. 44-45)
>
> . . . .
>
> Society at large is concerned with learning by reading whenever any large number of its members are affected by this process or whenever a few influential persons are profoundly affected. (p. 46)
>
> . . . .
>
> In the minds of its [the American library's] active creators there was always a clear and rationalized belief that this social institution is so necessary an agent for public enlightenment that its support like that of the schools, should be assumed by the state. The promulgation of reliable information to the electorate is a fundamental element in the modern theory of democracy. (p. 81)

Martin, 1937:

> In various ways the public library promotes intellectual life. It distributes information and by its organization integrates that knowledge. The individual is thus enabled to begin his quest where the previous generation left off, equipped with an understanding of the culture which he inherits. It provides intellectual tools; the library might be termed a laboratory for the mind. "Reading," says Ross, "is rapidly taking the place of oral discourse as a source of ideas." (p. 95)

Berelson, 1938:

> . . . freedom of librarians to "teach" what they believe. Librarianship must pay more attention to this educational program than to the methodology and mechanics which now intrigue it. . . . Most important, librarians must administer forums, reading groups, discussion groups, lectureships, etc., for informal guidance. They must give wide publicity to material on social questions. They must take education for democracy to the people. (p. 89)
> . . . .
> The library occupation with social affairs is to be educational; the patron will be encouraged to participate in critical discussion, to think and act on the basis of facts, . . . Understanding and critical thinking are what we are after, not dogmatic indoctrination.
> . . . .
> . . . I consider to be a vitally important, and neglected, function of the American library . . . adult education. . . . (p. 90)

Ogilvie, 1940:

> The raison d'etre of librarians is to aid in the spread of truth through books. But this involves some delicate balancing of values.
> . . . .
> [Librarians'] work as propagators of the truth of the printed word is too vital to brook undue interference. (p. 641)
> . . . .
> Not so much as teachers, but as guides, it is their duty to shape the way of public thinking by offering touchstones against which one may judge the crucial issues of all time.
> . . . .
> To it [the library] the future of civilization looks to fulfill its trust as a keeper of the keys. (p. 645)

Burke, 1947:

> The objectives to be achieved in our libraries whether they be for elementary grades, in the seminary or in institutions of higher education may be here listed. These ends embrace our concept of the philosophy of librarianship. First, the development of a world commonwealth; second, the development of an international

mind; third, the sponsoring of the ideas of Christian democracy; fourth, the promotion of the advancement of scientific truth; fifth, the combatting of current prejudices; and finally, the guidance of all library activities by a Christian code of ethics. (p. 13)

Broadfield, 1949:

> But his [the librarian's] task is not merely to *satisfy* the requirements of the thinker and the independent student of truth. He has the more fundamental task of helping to *create* such thinkers. . . . (p. 13)
>
> Formidable obstacles confront the librarian who would think himself, and create and satisfy thinkers. (p. 14)
>
> . . . .
>
> To help in the creation of a community of thinking men, holding opinions independently arrived at, is the main task of libraries. Without libraries a community of seekers after knowledge would be impossible. (p. 15)
>
> . . . .
>
> The human being is the most ultimate of ends, his free condition his highest condition, freedom of thought the most fundamental element in his freedom, and the library one of the first essentials in maintaining it. . . .
>
> Among librarians the prevalent attitude is to regard readers as citizens. . . . However, the best books are not written for citizens. Nor is it only as citizen that a man achieves the best of which he is capable, but as thinker, creator, and artist. . . . But the ultimate purpose for which democracy exists is to allow men to pursue the good life in freedom. . . . (p. 35)

Danton, 1949:

> The potentialities of a country's libraries . . . are, from the point of view of educational and sociological significance to the people, second only perhaps to the system of formal schooling. . . . [All people] may be expected to seek and to find in the free library information, education, guidance and recreation.
>
> There are few people who would not agree that one of the greatest problems . . . which mankind faces today is that of finding the means to create and to insure a stable, peaceful world. We can hardly expect to achieve this goal unless we bring about international understanding. This means that people everywhere must be given an opportunity to become intelligently informed about other countries and about the great social, economic, and political questions and problems of our times. The modern library . . . is in a unique position to make a vital contribution to this great cause, for nowhere else can the citizen expect to find full and impartial information. (pp. 2-3)

Garceau, 1949:

> The library, among other purposes, was created as a source of knowledge for an informed citizenry, upon whose collective judgment the success or failure of responsible democracy rests. (p. 51)

Butler, 1951:

> The librarian undertakes to supply literature . . . not so much for the immediate value of the knowledge imparted as on the theory that, in the long run, the process will sharpen the understanding, judgment, and prudence of the readers and thus sustain and advance civilization. (pp. 246-247)

Asheim, 1954:

> Functions of the library in society.
> . . . .
> E. To serve as an instrument of enlightenment and informal education. (p. 16)

Landau, 1958:

> [The librarian as expert has] the responsibility, not merely of interpreting the general will, but of guiding it when needed into paths of wisdom. (p. 173)

Berlin Conference, 1962:

> The aim of library science is to examine the social functions of libraries in view of existing historical conditions, and to elaborate the principles based on Marxist-Leninist teaching on cultural revolution--for the social utilization of literature in favour of the communist education of working people, and for the promotion of socialist culture and science. (p. 6 in Molnar, 1968)

Slovak dictionary of library terminology, 1965:

> [Library science is] knowledge dealing with the scientific elaboration of various questions of organization, administration and functions of the library. The subject of socialist library theory is the library, the activity of which is directed towards the communist education of the whole of society. (p. 23 in Molnar, 1968)

Sharr, 1970:

> [The] purpose of librarianship is the creation of meaningful interactions between information and people, . . .
>
> The fundamental assumption upon which democracy rests is that given access to the necessary information, people will choose the right policy and choose it more surely than will an oligarchy or an autocracy. But the essential condition is: given access to the necessary information. The library is the only medium which can give that information without bias and without slant. (p. 2)

Shera, 1972:

> Whereas the mass media, the newspaper, radio, television, are declaratory, the library is interrogative. To the library men come seeking truth, each in his own way and for his own ends. In the library the patron is not told what to think or when to think it, but in his search each must discover for himself the thoughts and opinions of others and try to understand them, to appreciate them for what they are, even though he may not share them. The library, then, must be a force for understanding, for cohesion, in a world of antagonisms, conflict, and specialization, but it must be a unifying, not a homogenizing force. . . . But there is a unity in the library process as an agent of communication. (p. 108)

Shera, 1973:

> The library should be the "crowning glory" of our educational system, . . . [and] the library should also be a place to which the good citizen can turn to make himself a better, more enlightened citizen. (p. 106)

Shera, 1974:

> [A library] is for the guidance of the individual through that intricate maze that is the record of the human adventure, so that man may better understand himself, the world in which he finds himself, where he has been, and where he may be expected to go. The library . . . should make available to man the record of what man has thought and done. The library . . . should be dedicated to the dissemination of the truth, to the freedom of the human intellect, ... (p. 154)
>
> . . . .
>
> [The library] is a tool for the enrichment and freeing of the human spirit. It lays bare the transcript of the human adventure. . . . [It] is for human self-knowledge. (p. 156)

Thompson, 1974:

> The role of libraries in education is a further manifestation of their power. . . . Books still remain the sole comprehensive and proven method of self-teaching.
>
> . . . .
>
> Library power in education in turn means the libraries have power as the instruments of material advancement, . . . (p. 8)
>
> . . . .
>
> Libraries have the power to produce (in the words of S. R. Ranganathan) 'material happiness, mental joy and spiritual delight'; they are 'social institutions charged with the duty of providing the means for the perpetual self-education of one and all'; and then contribute to the circulation of ideas, the harnessing of leisure, the demands of democracy, the spread of literacy, and the success of commercial and industrial enterprises.
>
> Expressed more radically, it is true to say that libraries are powerful instruments of social and political change. . . . From the few generations of working people who supplemented their meagre education by using their local library has sprung the present political situation in this country, which is fairer, more humane and more democratic. Ortega y Gasset has written: 'Democratic society is a daughter of books, the triumph of the book written by men over the book revealed by God, over the book of laws dictated by the autocracy'.
>
> Expressed even more radically, libraries exist for the sake of freedom of thought. (pp. 9-10)

Setty, 1977:

> Libraries have so far acted as traditional institutions, living in their ivory towers, hardly responsible for social changes. This is all the more tragic as the library is a powerful social institution capable of acting as a change agent and not just a witness of change. It could function as a force for change or remain a servant of the status quo. Libraries as social institutions should not only be influenced by the society but should in turn influence the society and channel change in the desired national direction. (p. 66)

Shaffer, 1980:

> All of these duties [of the librarian] are aimed at one primary objective--pushing back the frontiers of ignorance through the information and stimulation of learning materials. People must first know in order to act wisely. The goal of any educational institution is that of assisting people [to] become autonomous, creative, inquiring and able to determine their own destinies; i.e., helping individuals achieve real sovereignty over their lives, giving them purpose and direction. Everything a professional librarian does is in the direction of this goal. (p. 46)

6.3. Definitions about People: To create readers and elevate literary taste

Frieze, 1876:

> The propriety of connecting such [art] museums . . . with public libraries, is too obvious to need any lengthy discussion. Their aims are kindred, indeed identical. Both are designed to promote the intellectual culture of the people. (p. 440 in *Public Libraries*, 1876)

Fletcher, 1876:

> The old recipe for cooking a hare, which begins with "first catch your hare," may well be applied to the process of elevating the tastes of the uncultivated masses. Let the library, then, contain just enough of the mere confectionery of literature to secure the interest in it of readers of the lowest--not depraved--tastes; but let this be so dealt out as may best make it serve its main purpose of a stepping stone to something better. (pp. 410-411 in *Public Libraries*, 1876)
>
> . . . .
>
> . . .the real mission of the public library is to furnish, not recreation, not the means of earning a better living, but culture; and whatever we have said as to its mission being limited by the wants of the people must be understood to mean by their real wants, not their fancied ones. "Culture," says Matthew Arnold, "is indispensably necessary, ... the poor require it as much as the rich, ... and culture is reading; but reading with a purpose to guide it, and with system. He does a good work who does anything to help this; indeed, it is the one essential service now to be rendered to education." This is the service rendered by the public library if it not only supplies books, but educates people in their use. (p. 411)

Perkins, 1876:

> But a small library, which is not a treasure house for scholars, but rather a drinking basin for wayfarers, depends . . . upon the continual watchfulness, tact, and alertness with which not the wishes of learned men, but the public demand for entertaining reading, is understood and met and gratified and managed.
>
> . . . .
>
> The only practical method is to begin by supplying books that people already want to read, and afterwards to do whatever shall be found possible to elevate their reading tastes and habits. . . . For those who do not read, it is desirable that the habit of reading should be formed. A habit of reading is more necessary than any particular line of reading, . . . and to form the habit, easy reading--that is, reading such as people want, such as they enjoy--must be furnished first, and afterwards that which requires more effort. (p. 420 in *Public Libraries*, 1876)

. . . .

All such baneful literature should be as inexorably excluded from the public library as arsenic and laudanum and rum should be refused to children. This criterion is not difficult to apply, and it is demanded by all considerations of Christian civilization. It should exclude such books as Rabelais, the Decameron, . . .

. . . .

"Silly reading," "trash," at least what is such to many persons, must to a considerable extent be supplied by the public library. . . . But what is trash to some, is, if not nutriment, at least stimulus, to others. Readers improve; if it were not so, reading would not be a particuarly useful practice. The habit of reading is the first and indispensable step. That habit once established, it is a recognized fact that readers go from poorer to better sorts of reading. No case has ever been cited where a reader, beginning with lofty philosophy, pure religion, profound science, and useful information, has gradually run down in his reading until his declining years were disreputably wasted on dime novels and story weeklies. (p. 421)

Quincy, 1876:

Few persons could think it desirable to exclude all fiction from their town library. But it is one thing to admit certain works of imagination of pure moral tendency, which have proved their vitality by living at least a year or two; it is quite another thing to assume that the town library is to be made a rival agency to the book club, the weekly paper, the news stand, and the railroad depot, for disseminating what are properly enough called "the novels of the day."

. . . .

A gentleman . . . declared, in a recent address, that free libraries should distribute the literature known as "dime novels," seeing that these productions, although "highly sensational," are "morally harmless." The fallacy, as it seems to me, is almost too transparent for exposure. (p. 395 in *Public Libraries*, 1876)

. . . .

One of the most promising institutions yet born into the world must be bequeathed to our successors as an instrument always working in the direction of moral and social development. (p. 399)

Warren and Clark, 1876:

. . . the librarian has silently, almost unconsciously, gained ascendency over the habits of thought literary tastes of a multitude of readers, who find in the public library their only means of intellectual improvement. . . . [A primary duty of librarians is to be] purveyors of literary supplies to the people, . . . (p. xi in *Public Libraries*, 1876)

Winsor, 1876:

> Librarians do not do their whole duty unless they strive to elevate the taste of their readers, and this they can do, not by refusing to put within their reach the books which the masses of readers want, but by inducing a habit of frequenting the library, by giving readers such books as they ask for and then helping them in the choice of books, conducting them, say from the ordinary society novel to the historical novel, and then to the proofs and illustrators of the events or periods commemorated in the more readable of the historians.
> . . . .
> A reasonable conclusion, then, is, that the mass of readers in popular libraries crave pastime only; but they can be made to glide into what is commonly called instructive reading quite as early as it is good for them. (p. 433)

Dewey, 1886:

> You must think of the library, whether popular or scholarly, circulating or reference, as an essential part of our system of education. Whatever it has been in the past, this is what it is to be in the future and, while it will still do a great work in furnishing innocent recreation, even this feature will be utilized to develop the taste for better books, thus making the main work of educating and elevating the more practicable. (p. 98)

Sawtelle, 1878:

> But it has come to be understood that it becomes him [the college librarian] to be daily ready to be consulted in relation to any book or subject, to converse freely with the students in regard to their reading, inspiring their literary interest, guiding their taste, bringing to their attention the right kind of appetizing works, and if needful gently leading on the reader from light and tasty books to those of high quality and permanent utility. (p. 162)

Dewey, 1899:

> So the genealogy is this: reading begets reflection, reflection begets motive, motive begets action, and action begets habit, and habit begets that supreme thing--character. So we have come to recognize that if we are to accomplish the chief end that is before the people, we must strive to control the reading for others. (p. 77)

Schwartz, 1889:

> The principal "educational" work that a library can do is, I take it, to persuade people, by legitimate means, to read the best books it has; to aid students in their researches; and to cheerfully give advice and help *when it is asked for.* (p. 5)

Fletcher, 1890:

> [Certain requirements are] made necessary for the complete fulfilment of the [librarian's] relations . . . to the scholars and students whom he will be called on to assist and direct in their reading. (p. 265)

Dewey, 1898:

> Of course no library intends to circulate injurious books, but equally no town intends to distribute harmful water. . . . The mortality tables make plain the physical defect, but alas! science has as yet devised no instruments delicate enough to record the greater danger to the individual and the State from poison in the great current . . . of modern reading matter. . . . [The great problem of the modern library is] excluding the pernicious, which I sum up in the word filtration. (p. 2)
>
> . . . .
>
> The mind will inevitably rise or fall to the level of its habitual reading, and we apostles and missionaries of the book have no more disheartening outlook than on the readers whose literary atmosphere is limited to the modern sensational newspapers. (p. 3)

Dana, 1906:

> Foreigners, knowing no English, flock to the factories. The library calls in the children, and gives them the English books they ask for; through them it attracts the parents; learns that the latter wish to read of their new country in their own tongue; finds that there are no books in foreign languages which simply and briefly describe us and our ways, and sets to work to have them written. (p. 17)
>
> . . . .
>
> In due course every school-room becomes a library, every teacher a librarian, and every pupil is encouraged to form the habit of reading good things and collecting ideas.
>
> . . . .
>
> In the libraries are the books of the wise; the very souls of the wise. We are all learning to read; perhaps the library will in time learn how to induce more to read the best. If many read the best, interests will multiply and deepen and, if Herbart was not mistaken, broader views will be taken and wiser councils will more often prevail. (p. 18)
>
> . . . .
>
> . . . in a library's books are found all the interests of life; . . . in their books are all the thoughts and deeds and dreams of all men, and . . . through these their books they may get the broad and wholesome view of things. (p. 19)

Bostwick, 1907:

> This lack of interest in books I believe to be noticeable largely because we have changed our whole attitude toward the relationship of literature to the people. Love for books used to be regarded as properly confined to a class; that the bulk of people did not care for literature was no more significant than the fact that they had never tasted *paté de foie gras*. Now we consider that everyone ought to love books--and the fact that vast numbers of people do not, no longer seems natural to us . . . . Some, it is true, are beginning to care for books by caring for poor and trashy books. These, however, are on the right road: they are on their way up; it is our business not to despise them, but to help them up further. (p. 28)
>
> . . . .
>
> The busy assistant at the desk may have a chance to say but a single word. Shall that word relate to the mechanics of librarianship--the charging system, the application form, the shelf-arrangement--or shall it convey in some indefinable way the fact that here is a body of workers, personally interested in books and eager to arouse or foster such an interest in others? (p. 29)

Foss, 1909:

> [The first great work of the tolerant librarian is:] To get good books and then get them read. (p. 35)

Putnam, 1915:

> I take it, therefore, as unavoidable that a public library shall include literature of the day. . . . It will certainly supply many [books and periodicals] far inferior to the "standards": inferior in literary form, in intellectual power, in moral tone. It need not supply those admittedly debasing. (p. 42)
>
> . . . .
>
> . . . I am personally in favor of leaving the "current fiction"--that is, all novels within one year after publication--to the subscription libraries. (p. 43)
>
> . . . .
>
> There remains the question of taste. And it is as to this in books, as in the play and the moving picture, that the opportunity for improvement chiefly lies. (p. 48)
>
> . . . .
>
> The modern librarian of a public library . . . has often to create the impulse [to read] as well as to direct it. . . . He must be informed not merely as to the book, but as to the reader. He must understand him and what actuates him.
>
> . . . .
>
> In the promotion of morality and of taste, however, their service [i.e. public libraries' service] is chiefly auxiliary; and you must refuse to admit them accountable as if the only responsible agency. (p. 49)

Bostwick, 1920:

> [The general services of the library to the community can be analyzed into four types of special service:] the provision of books, the collection of information, the control and guidance of reading and community-centre service. (p. 349)

Thompson, 1931:

> [Librarians' purpose is] cultivating appreciation of books and broad acquaintance with literature in all its branches, . . . (p. 583)

Carnell, 1934:

> Our role is not that of teacher, but the humbler one of guide. (p. 42)

Martin, 1937:

> The public library preserves and promotes values--scientific, artistic, cultural, even religious and ethical. (p. 103)

Wheeler, 1946:

> Evidently both schoolmen and librarians need to find better ways to help individuals create their own inner reservoirs of happiness and spiritual strength for the journey through life--springs fed by good books. (p. 11)

Mukherjee, 1966:

> For society, two active functions are performed by the library, and these are to entertain and to educate. It endeavours to provide the best recreational reading, and to use every skill, every bit of imagination, and every contrivance to lure the reading public to read for pleasure, a habit if properly cultivated, may ultimately lead the individual to read for knowledge also. Moreover, it is hardly possible actually to read for pleasure without at the same time getting knowledge. (p. 12)
>
> . . . .
>
> It is also the purpose of library service not merely to satisfy the requirements of readers, but also to create readers. The reader is to be assisted to strengthen his conscience by liberal provision of all necessary material of intellectual and literary nature. (p. 17)
>
> . . . .
>
> Librarianship . . . has a responsibility to literature for the maintenance of a due standard of taste. . . . Books of dubious value, however, popular, may ultimately be rejected by libraries in this context. . . . In the long run, such a policy supports and encourages creative work. (p. 21)

Carnovsky, 1967:

> I know of no finer charge to the librarian than to take part in the battle to raise the level of one's sights, and to introduce the individual to the world of great literature. . . . (p. 491)
> . . . .
> The challenge to librarianship is to motivate and encourage wider and deeper reading of books and to make these and other resources available to meet the growing demands both for an intellectual and cultural frame of reference and for specialist information. (p. 21)

Shaffer, 1968:

> [The librarian's primary objective is] to assist learning through the information and stimulation of printed material. It is the librarian upon whom the writer and publisher depend, and to whom the reader turns. He is not primarily a keeper of books but rather a dispenser of books. He stimulates, teaches and persuades people that they must first know in order to act wisely. (pp. 56-57)
>
> A very important function of the librarian is to redirect the reading pattern of many adults. (p. 57)

6.4. Definitions about People: To inspire

Nil additional.

6.5. Definitions about People: To amuse or entertain

Dewey, 1899:

> So the province of the library is to amuse, to inform and inspire. (p. 77)

Danton, 1949:

> [All segments of the population] may be expected to seek and to find in the free library information, education, guidance and recreation. (p. 2)

Landau, 1958:

> Broadly there are three possible purposes of a library: teaching, research and entertainment; . . . (p. 173)

6.6. Definitions about People: To conduct research and advance knowledge

Cotton des Houssayes, 1780:

> What, moreover, would be the object of these precious collections, gathered at so great expense by fortune or by science, if they were not consecrated, according to the intention of their generous founders, to the advancement, the glory, and the perfection of science and literature?
>
> But that a library may fully attain the end of its foundation . . . it should be administered by a librarian distinguished for . . . an erudition at once ample and considerate, which has solely in view the advancement of knowledge, and which is ever able to distinguish, with equal taste and accuracy, original works that are worthy to be proposed as models, from those equivocal productions justly condemned to forgetfulness for their mediocrity. (pp. 42-43)

Asheim, 1954:

> Functions of the library in society.
> . . . .
> B. To help advance the sum of knowledge through research. (p. 16)

Landau, 1958:

> Broadly there are three possible purposes of a library: teaching, research and entertainment; . . . (p. 173)

Winger, 1961:

> The librarian's task has been to collect and organize the important records of the time in order to bring them to bear in all possible ways on the intellectual problems of the time. (p. 35)

Danton, 1962:

> . . . the functions of these kinds of libraries [national, state, university, and special], in general, are to maintain for generations in the future the written heritage of man in the past, and through this maintenance and conservation, to make it possible for our contemporaries and our successors to add to the world of learning and to push back the frontiers of knowledge. I would submit further that, no matter what field of man's endeavour one chooses, such a pushing back of the frontier, such an increase in what man already knows, cannot be accomplished without reference to what man has done in the past. And what man has done in the past, in so far as he has written it down, is found chiefly in the libraries of the kind I have just mentioned. . . . (p. 6)

Whitenack, 1963:

> Surely the librarian is concerned with enhancing knowledge so that man may achieve a better understanding of the universe in which he lives and other peoples who inhabit this world with him. The librarian is concerned with organizing, relating and structuring knowledge for the best uses of mankind. (p. 19)

Kaplan, 1964:

> There is a third general and basic function of the library: as an instrument of research. . . . in its genuine sense. . . .
> What I am concerned about is the way in which knowledge already available can most effectively be put to such use as to increase the knowledge that is available. Indeed, this process of increase can take place only on the basis of knowledge available. (p. 10)

Stone, 1965:

> [One function of librarianship is] to exercise both "feedback" and "critic" service functions in behalf of producers as well as consumers of the communication resources provided. (p. 167 in Shaughnessy, 1976)

Mukherjee, 1966:

> By his [the librarian's] skilled organization and direction, he brings his collection to the point of usefulness. This aspect of librarianship has been beautifully described by G.R. Lyle in the following lines: "there is an essential connection between advances in knowledge and the discovery of truth, and the indexing, analysing and cross-referencing of librarianship. By acquiring, indexing and coordinating, the librarian strikes the balance, corrects where previous representation misled, and drives the harder the next researcher seeking the truth." (p. 12)

Sharify, 1972:

> This function--the "matchmaking" between knowledge and the knowledge seeker--seems today, to too many, to be somewhat passive, lonely, and unchallenging.
> Centuries ago, the main role of the librarian was the conservation of recorded knowledge; the libraries were treasure houses to be guarded religiously. Later, we moved from the guardian role to the matchmaking position, and treasure houses became bridges. But already there are significant signs to indicate that tomorrow's librarians wish to take steps beyond the conservation and bridgemaking functions. While accepting and respecting these functions, they wish to leave the bridge and move into the mainstream of society, live <u>in</u> it, rather than on the edge of it. They wish to be contributors of knowledge, rather than to remain solely the makers of the keys to the treasury of knowledge.

> . . . .
> The librarians of tomorrow would be more than mere organizers of recorded knowledge. They would take part in reshaping and creating it. (p. 136)

6.7. Definitions about People: To manage knowledge

Nil additional.

7. Definitions about Objects and People

7.1. Definitions about Objects and People: To make accessible

Learned, 1924:

> . . . a public tax-supported book collection is an indispensable basis for a community intelligence service, . . .
> . . . .
> Progressive librarians everywhere realize that provision must be made for digesting and reducing to usable form the great masses of important information now accumulating with unexampled rapidity, and that means must be found whereby trustworthy knowledge of wider range than heretofore may be made available, . . . (p. 26)

Bishop, 1931:

> The librarian is in a very real sense the guardian and preserver of that most precious part of humanity--its thought. . . . [His] is the task of gathering these books on which thousands of men have labored, and then so keeping them as to render them not only safe against destruction but more and more useful because of his skill. A library which not only has the books it should . . . but which also by reason of its excellent catalogs and its skillful arrangement of the books themselves renders the best thought of the past and the present generations on all subjects readily available to every inquirer, is a marvelous instrument. (pp. 944-945)

Reece, 1936:

> What had to come before library work could be distinguished from other activities concerned with books, and consequently before it could be defined, was the realization that it is both intermediary and active. . . . [It] required to be viewed as dealing predominantly with the management and utilization of book resources; . . . Briefly, the librarian need not discover

> knowledge nor create books, and his major reason for existence is that his efforts make the content of books more available and operative than otherwise it would be. Far from narrowing his function, this description has proved usually more sufficient to his work than have his resources. No limits are easily set upon his endeavors when he is called upon, after assembling books, to preserve them, to arrange them, to offer them to readers, and even to interpret them--all with reference to an ascertained want. (p. 5)

MacLeish, 1940:

> For it is we who are the keepers--the proud keepers--of these records of the experience of our people, these precedents for decision. And it is we, if it is anyone, who will devise means and establish ways to make these precedents available to those who need them. (p. 388)

Savage, 1946:

> In the first part I pointed out that a man's potential library embraced all on his subject that he might ever want; that his actual library embraced all he had access to; and that the gap between the potential and the actual was far too wide to be creditable to librarianship. To lessen the gap we must muster books (all the books, for example, in a town from public, society and club libraries). We must advertise books in printed co-operative catalogues, and by teaching bibliography. Finally, we must develop access to books. (p. 77)

Burke, 1947:

> For in the true sense of the word a library is a mechanism for the cooperative supply of publications according to some plan administered by a custodian. In this manner the publications are made accessible to its particular clientele. (p. 12)

Leigh, 1950:

> In the broadest sense all types of libraries here and in other countries form a loose international network performing the common function of storing, arranging, and making available for current and later use the world's recorded events, ideas, and facts of all kinds deemed worthy of preservation. (p. 4)
> . . . .
> [The common objective of all libraries] is the conservation and organization of the world's resources of recorded thought and fact so as to make them available for present and future users. This is an obvious utility for any civilization as soon as it feels the need for something more than oral tradition. (p. 12)

Morley, 1950:

> Special Library
> A service organized to make available whatever knowledge and experience will further the activities of a particular organization. . . . (p. 20)

Asheim, 1954:

> Functions of the library in society.
>
> A. To preserve and make freely accessible the recorded experience of the race. (p. 16)

Egan, 1955:

> That libraries are being established in increasing numbers within such organizations [as the professions, scientific, learned, and technological societies, industrial corporations] is a natural development, for we know that accessibility is a prime factor in use. (p. 20)
> . . . .
> Yet librarians do occupy a rather special position, in that as the stewards, or perhaps traffic managers, of the flow of recorded knowledge our services are essential to the achievement of many, if not all, of the other groups [in society]. (p. 21)

Mukherjee, 1966:

> [The reader] should be helped to form his judgment by giving him access to unsuspected interrelations of knowledge, through catalogues, indexes, bibliographies and other library tools (p. 17)

Carnovsky, 1967:

> And so I return to the library we all know, to consider what I shall call the permanent amid the changing. I mean by this the significant book, and the continuing obligation of the library to be aware of it, to make it available, and to stimulate its reading. (p. 490)

Rothstein, 1968:

> Our mission as librarians is to make the library the source of widest access to and fullest representation of human thought. In short, we hold ourselves ready to guide and advise readers but not to control them, the reader's right to read as he pleases overriding all other concerns. (p. 157)

Johnson, 1970:

> [The fullest purpose of the library is] making the heritage of the past fully available to all the people all the time. (p. 494)
> . . . .
> Thus, directly or indirectly, modern European culture is a product of its preserved heritage in graphic form--in other words, of its libraries. (p. 495)

Penna, 1970:

> The purpose of library services is to provide access to recorded information and ideas for the community and the individual. This involves the acquisition and exploitation of books and other media of communication for the benefit of a particular community, local, institutional or national. (p. 21)

Budington, 1971:

> Without much fear of contradiction, librarians lay claim to a role in the management and transfer of information. (p. 1)
> . . . .
> The problems of information management and transmission have attained critical levels to the extent that their implications and solutions have become a national, political, and social phenomenon. Since the interface between existing record and potential user is crucial, the concept of "access to information" has risen starlike to guide and inspire. (p. 2)

Wasserman, 1972:

> For the fact of change itself, causing the turbulence which characterizes the nation, calls for appropriate support in the interests of a healthier social and political condition. The situation poses a particular challenge to an institution charged with responsibility for information dissemination. Information access is of more importance under conditions of change than in a time of stability. (p. 4)

Becker, 1973:

> For many centuries, libraries have served as our major storehouses of knowledge. They accumulate books, periodicals, and newspapers, organize these materials for everyday use, and provide various services to help people find information. . . . Libraries perform several functions: They select and acquire materials for their users, they catalog and classify these materials so that users can find what they're looking for, they circulate books so that a user can take material home, and they answer questions on almost any subject. They study of these functions is called <u>library science</u>.

> Libraries are for everyone. They provide free and open access to information for recreation, education, and research. (p. 15)
> . . . .
> Library science. The study of the way libraries select, acquire, catalog, circulate, and make available books and other information. (p. 86)

Johnson, 1973:

> In its most elementary form, a library is simply an organized collection of informative materials. (p. 6)
> . . . .
> The library is a means of communication in the sense that it is a storehouse of recorded information, so arranged as to be available for continuous use over an indefinite period of time. (p. 9)

Cassata, 1976:

> The library has been described as having a technical, a social, and an economic function. The technical function is similar to that performed by the computer; that is, it has a memory in which data are stored and retrieved upon demand. The library's social function is realized through its role in the total system of communication. It not only serves a diversified audience but its effectiveness can be measured in terms of making materials, within or outside of its collection, easily accessible to that audience. Its economic function is realized through extending its single copies of books and other materials to more than one user. (p. 216)
> . . . .
> [The] library's function can be likened to that of the totality of the mass media: that is, through the selection, organization, and servicing of its collections, it informs, educates, entertains, and passes along the accumulated culture of society from one generation to the next. (p. 217)

Mathews, 1976:

> [Librarians and others] worked together to bring information access, through libraries, to the front and center of American life, . . . (p. 103)

Donaldson, 1977:

> I am perfectly happy to accept that your [library] activity is indeed fully justified in those cases where it is conducted on strictly commercial lines, where freely choosing customers are ready to meet the full cost of the services provided. (p. 272)
> . . . .
> Looking at the matter in the most general way there is certainly an argument that it is intrinsically a good thing to collate knowledge compendiously, to disseminate it for present

use and to store it for posterity. This argument obviously applies to scientific information. The progress of science depends to a considerable extent on the ready availability of the results of all research.

Nor should we underrate the archival function of your . . . work. . . . You are safeguarding the raw material of history.

. . . .

The difference between museums and galleries and archives proper is that the former have a duty to display, while [the latter's] . . . duty is only to file and make available. (p. 273)

. . . .

You are acknowledged specialists in the task of reducing to order and making available when required apparently incomprehensible masses of material. (p. 274)

. . . .

Indeed in deciding how many resources can be made available, a balance has to be struck between dissemination of information for current use and the archival function. (p. 275)

Lancaster, 1977:

The functions of all libraries are essentially the same: to acquire bibliographic materials related to the interests of a particular user population, actual or potential; to organize and display these materials in various ways; and to make them available to users. In a wider context, libraries are part of the entire process of transferring information via the published record. This information transfer process is illustrated in Figure 1, which is adapted from King and Bryant [1971]. The diagram represents the composition, publication, and distribution of a document; its acquisition by libraries (and others); its organization and control (i.e., the library processes designed to make the document accessible to users, including cataloging, classification, indexing, abstracting, shelf arrangement, and related activities); its physical presentation to the user; and its assimilation by the user. This transfer process may be considered as a cycle. Assimilation, the stage at which the user is "informed" by a publication (i.e., his state of knowledge on a subject is changed), may lead to some application of this newly acquired knowledge (e.g., in research); and this may, in turn, result in the composition of a new document. (pp. 2-3)

While librarians should be interested in all the activities illustrated in this diagram, libraries are directly concerned only with the fourth, fifth, and sixth steps shown (except insofar as libraries themselves may be responsible for composition and publication). The assimilation of a document by a user, once it has been supplied, is generally outside the library's sphere of influence; that is, libraries exist to bring documents and users together. The responsibility of a library is to ensure that the user gains access to publications that are pertinent to his interests and comprehensible to him (i.e., written in a language he can read and at a level he can understand). (p. 3)

. . . .

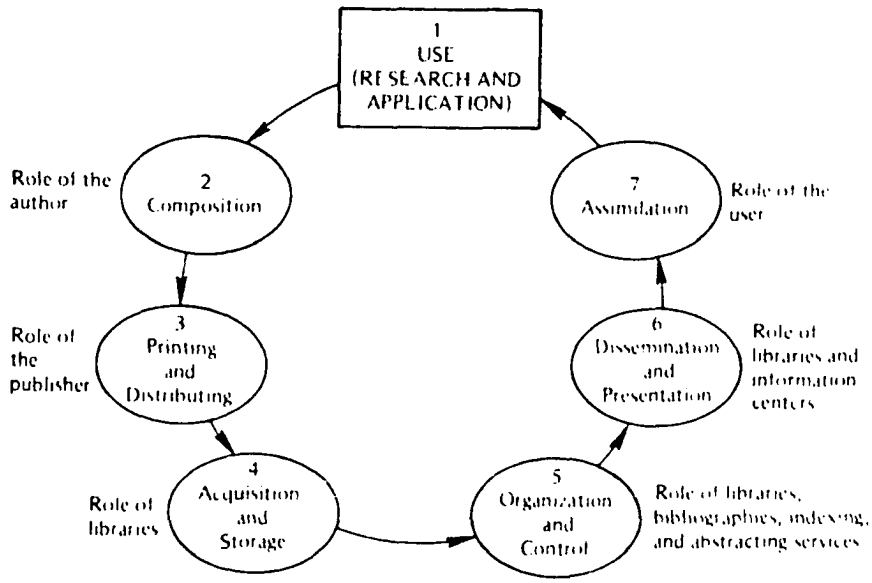


FIGURE 1 The transfer of information by published documents.

(p. 3)

. . . .

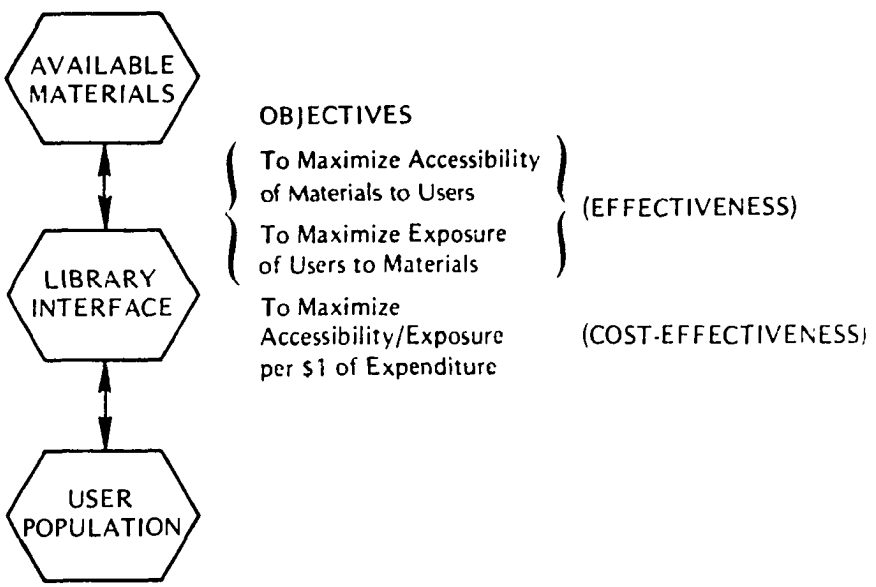


FIGURE 2 The interface function of libraries. (p. 6)

. . . .

> In summary, a library exists as an interface between a particular user population and the universe of bibliographic resources. The objective of the library is to maximize the accessibility of these resources to the user or to maximize the exposure of the users to the resources. In addition, the library should be organized to minimize the amount of effort required to obtain access to needed bibliographic materials, and to supply such materials as soon as possible when the need for them arises. (p. 8)
>
> . . . .
>
> Ease-of-use factors include physical accessibility (e.g., where the library is located and where various portions of the collection are stored) and "intellectual" accessibility (e.g., how well a collection is cataloged or indexed, how easy the catalog is to use, how clearly the shelves are signposted), as well as miscellaneous accessibility factors governed by library policies (e.g., which books may circulate and for how long, how many books may be borrowed at one time, and so on). (p. 312)

Orr, 1977:

> If the ultimate theoretical aim of the profession of librarianship is to ensure that every single member of society has access to the library memory, then this has been achieved to some extent in the developed countries of the world. (p. 115)
>
> . . . .
>
> [Allowing] access to the memory store [is] . . . the output from a library system. (p. 185)
>
> . . . .
>
> A library is a communicatory tool created by man to complement his own deficient memory. It is a store for his graphically produced records no matter what their format.
>
> Its relationship with man is cyclic; it feeds his mind with information, much of which is reprocessed and returned to the library. The library system therefore exhibits growth. (p. 212)
>
> . . . .

	Function	*Man*	*Library*	*Computer*
Stimulus/Input	Perception	Senses	Selects	Accepts man-made signals and codes
	Reception		Acquires	
	Recognition	Understands		
	Retention	Memorizes	Stores	Stores
	Retrieval	Remembers	Finds items by indexing methods	Recalls signals as programmed to do so
	Relay	Communicates	Allows access	Delivers print-outs
Response/Output	Re-creation	Invents		

TABLE 1

(p. 16)

Setty, 1977:

> Libraries collect recorded knowledge in one or more forms, organize materials in a systematic way and make them available to their patrons. Libraries have functioned as store houses of knowledge for centuries, often stressing the function of preservation.
> . . . .
> However, they have paid less attention to serving the patrons. For a long time libraries have served a small section of the privileged people such as noblemen, princes, scholars, etc. Their doors were not open to the common man. (p. 59)

Sullivan, 1977:

> The librarian probably identifies himself in regard to his profession in at least two ways--as one working in a specific library specialty (such as cataloging, reference work, children's services, or administration) and as an employee of a specific kind of library (school, public, medical, or any one of other more precise categories). (pp. 12-13)
> . . . .
> Perhaps the first individual who had the idea of sorting, collecting, and making more accessible clay tablets or papyrus scrolls should be recognized as the first librarian. Someone did, and the reason was probably for service and economy--two goals that still affect the purposes of librarianship today. Condensing many centuries, we may see that the status of the librarian--that is, the person responsible for maintaining a collection of materials for use by others--rose when the need for records was recognized as important and declined when that need seemed less important. (p. 14)

Wilson, 1979:

> [The librarian] must have a different understanding of the graphic record, not an understanding of its content in depth . . . but, rather, an in-depth understanding of the graphic record as a structure, an entity. Like the teacher, the librarian will identify, locate, acquire, and disseminate the graphic record. The librarian, however, undertakes these behaviors toward the graphic record as an entity. The librarian, after analysis of user needs, will apply his or her understanding of the graphic record in order to march relevant portions of it to user needs. The librarian's dissemination of the graphic record differs from that of the teacher. The librarian does not disseminate content and does not disseminate by teaching but by means of library processes, by means of a librarian's behavior--by creating, operating, and maintaining a library and providing library services through the myriad behaviors that these require.
>
> Just as some of the behaviors primarily associated with the role of the generic librarian are found in the role of the generic teacher, so, too, is the reverse true. Librarians sometimes teach. They teach when teaching is the best, perhaps

> the only, method to provide the user with efficient and effective access to the graphic record. This is library-use instruction, which when limited to a subject area and done in some depth may be called bibliographic instruction. (p. 155)

Lancaster and Smith, 1989:

> In fact, it seems reasonable to assume that libraries as institutions will decline as paper publication gives way to electronic publication. Although they still remain important repositories and exploiters of the literature of the past, there will be little to "collect" in the future. Large collections of physical artifacts will give way to on-line access to text on demand. In the world of electronic publication, the economics of information access is vastly different from the economics of access in a print-on-paper environment. In the latter, institutions or individuals must make a capital investment in a publication in order to make it readily accessible. In the former, however, a user gets access when needed and pays only for the amount of this access. . . . (pp. 198-199)
>
> While the library as an institution may decline, there is no reason to suppose that there will be an accompanying decline among information specialists. Indeed the reverse is more likely. The array of information resources, accessible through a single terminal, will be so immense that professional guides to these resources will certainly be necessary. . . . The profession is likely to go through a deinstitutionalization process or, perhaps more correctly, a reinstitutionalization process. Because the "electronic librarian" is freed from dependence on a collection of physical artifacts, this information professional will be able to work in any office or, indeed, from the home. Complete freelancing seems less likely, however, than the reassociation of information professionals, some still affiliated with libraries or library networks, other with academic departments, research groups in industry, health care teams, or other groups needing intensive information support, and yet others associated with information consulting companies or . . . belonging to group practices loosely resembling the group practices in health care or in law that we know today. As previously suggested, the informtion professional of the future will be primarily a consultant, furnishing information on demand, acting as a guide to available resources, providing training in the use of these resources, assisting users in the development of SDI [selective dissemination of information] profiles, advising on the organization of personal electronic files, organizing and controlling electronic mail failes in company environments, and providing a host of other information support services much richer and more varied than those offered by the librarian of today. (p. 199)

Smith, 1980:

> [The] information revolution of the 1980s and 1990s offers us a step towards a new kind of Alexandria, i.e., towards an abundance of information of universal availability, but one in which the constraints arise from the modes of storage and cataloguing, rather than from the more traditional constraints of censorship and governmental control. In other words, the librarian or the librarians' computerized successor becomes a more crucial guardian of knowledge than in the past, . . . (p. xiii)
> . . . .
> The librarian makes information accessible to the consumer in an age in which the mere storage of information is becoming cheaper and cheaper. (p. 314)

7.2. Definitions about Objects and People: To retrieve

Smith, 1968:

> As keepers of the stored knowledge, we rank with theology, medicine and law as one of the oldest professions. (p. 12)
> . . . .
> What is this "whole field" of our discipline? It should be taken to mean an acquaintance with and appreciation for: book and non-book forms; book production (ink, paper, binding); printing, publishing and presses; bibliographic description and control, research, retrieval; censorship, copyright; graphic arts; cooperative ventures and associations; mechanical processes and devices; the physical plant; the stock-in-trade and the stocking of the library; the personnel, its training and administration; legislation; education; the library's public and the library in society. (p. 13)

7.3. Definitions about Objects and People: To transfer

Butler, 1933:

> [The library] is now a necessary unit in the social fabric. Culture must transcend the individual for it is essentially a social cumulation of experience whereby the men of each generation possess potentially at least, all that their predecessors have ever learned. Books are one social mechanism for preserving the racial memory and the library one social appartus for transferring this to the consciousness of living individuals. (p. xi)
> . . . .

> [The fundamental phenomenon of librarianship] is the transmission of the accumulated experience of society to its individual members through the instrumentality of the books. (p. 29)
>
> . . . .
>
> Books are mere records of knoweldge. Their contents are of varied nature. The graphic text may record a factual observation, an opinion of its meaning, or a description of the emotion which it created in the writer. The book is not the fact, the opinion, or the feeling itself, it is only the record of the author's knowledge that he had thus perceived and thought and felt. In its millions of such records written by millions of different individuals through centuries of its life, society possesses an almost complete account of its own knowledge. In the mass of these books society has, as it were, constructed a material apparatus of memory that will outlive many generations of its members. (pp. 43-44)
>
> . . . .
>
> [The] basic elements of librarianship consist in the accumulation of knowledge by society and its continuous transmission to the living generation so far as these processes are performed through the instrumentality of graphic records. (p. 84)

Waples, 1933:

> [Information from research] should show where the library fits into the general distribution of reading in each community studied. (p. 270)

Miller, 1936:

> The library does not disseminate ideas or knowledge directly, except incidentally or through instruction in the use of books and library records. The library's main business is distributing books. (p. 298)

Martin, 1937:

> The social need which has engendered the [public] library gives rise to the definition: the library is an institution for the transmission of group culture and knowledge as recorded in printed materials. (p. 91)
>
> . . . .
>
> . . . chronologically the library has gone through first a stage of conservation, and more recently a stage in which transmission is added. Currently a third stage emerges, that of evaluating the printed productions of the group and selecting a part of these for conservation and transmission. This last is a qualitative stage. Conveyance and distribution of one portion of the group culture leads directly to social solidarity and social homogeneity. The racial experience, recorded in books,

> directs the attitudes and behavior of one and all into sanctioned and prescribed forms. Standards of value are inculcated, socially desirable habits are defined, behavior patterns are fixed--in short, the individual is socialized. (pp. 94-95)
> . . . .
> . . . the library promotes both socialization and individualization. On the one hand, it transmits the social heritage and inculcates the values and experiences of the past into the group, with a unifying effect; on the other, it enables the individual to appraise present trends and future values, enhances the quality of his personal life, and provides a means for climbing the social ladder. (p. 95)

Goldhor, 1942:

> [The final factor in the individual reading situation is] the distributing mechanism whereby print and readers are brought together.
> Every time a publication is read, some means of distribution is involved. The distributing agency may be identical with the author . . . or with the reader . . . entirely informal, . . . But generally the distributing unit is a separate agency formally organized for the purpose, for example, bookstores, rental libraries, public libraries, or newsstands. (p. 108)
> . . . .
> Whenever a [print] distributing agency selects publications for its shelves, it does so for a purpose; and that purpose can be thought of in terms of the individual reading situations which the agency aims to encourage and help consummate. (p. 109)

Egan, 1956:

> Clearly, the library is part of the general communication system, and any effective theory of librarianship will have to be related to the evolving theory of communication in general. Mass communication, however, might be described as declarative, whereas library services are interrogative communication. . . . In library service, the dynamics are reversed. The recipient, although he may be stimulated through promotional activities, initiates a request for a certain message or type of message, and the librarian must then find, somewhere in the total body of recorded communication, the particular message or type of message requested. Current communication theory has nothing to say about this type of communication problem, . . . (p. 205)

Butler, 1951:

> [The chief function of the library] is to communicate, so far as possible, the whole of scholarship to the whole community. The librarian undertakes to supply literature on any and every subject to any and every citizen for any and every purpose. He does this not so much for the immediate value of the knowledge imparted as on the theory that, in the long run, the process will

> sharpen the understanding, judgment, and prudence of the readers and thus sustain and advance civilization. (pp. 246-247)

Goode, 1961:

> The librarian must organize and order the flow of information. (p. 14)
> . . . .
> Most of the significant technical problems of librarianship occur only at a certain size of "flow"--number of incoming books, number of books on the shelves, number of readers, etc. Otherwise, an individual, a coporation, or a small township might simply use an assistant, an aide, or a clerk to "keep things in order." (p. 15)
> . . . .
> [The central task of librarians is] organizing the flow of publications. (p. 21)

Kaplan, 1964:

> [There] are also, in part as a result of this very growth [in scientific inquiry], remarkable advances in what we might call semantic transportation. There are faster ways to get out to this new frontier than previously available, and this, it seems to me, is one of the great and pressing tasks which your profession must increasingly come to grips with. The challenge is to maintain the flow of ideas; . . . (p. 11)
> . . . .
> Surely knowledge of the uses, and therefore of the users of information, must always remain fundamental. That is nothing other than knowledge of people and of the various things that people do and of the various ways in which in the course of those doings they generate and transmit and interpret ideas or information. (p. 12)

Slamecka and Taube, 1964:

> [The] *raison d'etre* of librarianship is "service."
> . . . .
> [The objective of librarianship] is to mediate . . . knowledge by facilitating its communication between and within individuals, societies, classes, and other echelons of manking. (p. 64)

White, 1964:

> [The chief concern of librarianship] is to assure continuance and full use of this power [given man by writing and other means of communicating ideas, to retain, organize and use the accumulated heritage of all generations of all mankind]. (p. 11)
> . . . .

> Libraries are concerned with the entire spectrum of knowledge. . . .
> Is the library the creature or the creator of this literate world in which we live and move and have our being? It is both at once. Librarianship stands for the accumulated power over the works of the mind, . . . reason, intelligence. (p. 12)

Raymond, 1965:

> [Let] us lay out a theoretical model of the entire process envisioned in the 1975 [Intrex] goal, "an information transfer system including library functions". We must first decide how much of the actual, real-world process we wish to represent in the model. It seems clear that it will be difficult to describe and deal with telelphone calls among friends, corridor conversations, invisible colleges, newspaper reading, and similar informal aspects of the total communication problem. It will probably be important to reflect the influences of informal communication later in some way; but, for a start, let us try to represent the formal system.
>
> Our system will include persons who submit written or machine-recorded messages. We shall call these persons authors or, more generally, sources. It will also include persons who receive the messages; we shall call these persons users. Identified individuals may be both sources and users during the operation of the system.
>
> Linking the sources with the users is a man-machine complex which interacts with both sources and users. Its interaction with sources may be direct, or it may be through one or more intermediaries. Some of the intermediaries may be similar man-machine complexes in other locations.
>
> Recorded messages (in some cases, documents or parts of documents) that are processed through the system will range widely in format and content. Generally we shall identify as a message any record that is normally handled as a unit during processing, and is distributed or disseminated as a unit to a user. (p. 256)
>
> . . . .
>
> To specify the model more completely and to make it look more like the real-world system, let us put some structure into the complex First we split the complex into two, interrelated parts. There is a message-handling part, which carries out the physical processes of receiving, storing, retrieving, copying for dissemination, and delivering copies of messages to users. There is a control part which selects messages and sources of messages, orders acquisition of messages, selects and derives the data needed for control of the messages, makes files of control data available to users, and controls all the functions of the message-handling part. The control part of the complex also selects messages for removal from storage and removes the associated control data from the control files. It collects control data that describes the interests of users and is thus able to order selective dissemination of messages by the message-handling part. (p. 257)
>
> . . . .

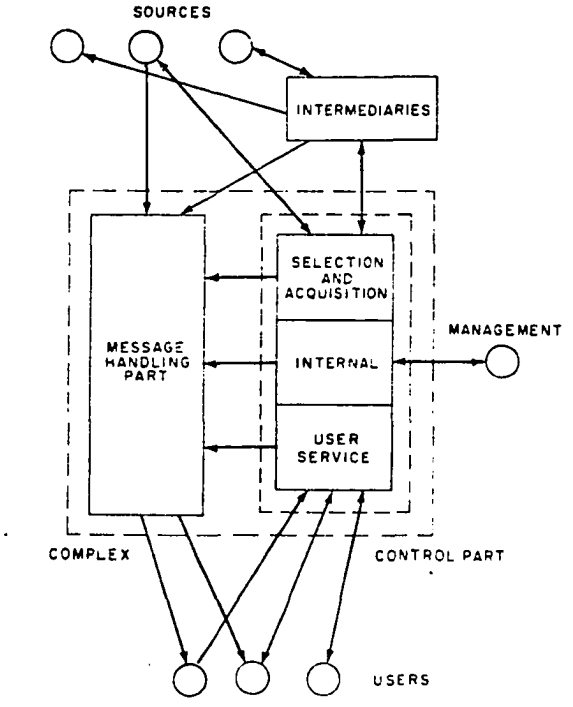


Fig. 1

(p. 258)

Stone, 1965:

> [The function of librarianship is] conscious interruption . . . of the total stream or flow of recorded ideas and information, to draw off selectively manageable amounts for storage and later retrieval and distribution to individuals or groups in whatever media forms or formats might be required to satisfy known or anticipated needs, and to exercise both "feedback" and "critic" service functions in behalf of producers as well as consumers of the communication resources provided. (p. 167 in Shaughnessy, 1976)

Mukherjee, 1966:

> "Librarianship should be viewed as a means of communication between knowledge and popel; . . ." (p. 40)

Asheim, 1968:

> [The librarian's unique task is] the ordering of knowledge and its dissemination and interpretation to users. (p. 1100)

Vavrek, 1968:

> . . . *reference service is the entire congeries of library activities that aid the flow of needed information to the user.* (p. 508)
> . . . .

> [Reference librarianship, or reference service:] the entire gamut of activities which directly or indirectly affect the library must be considered as variables in the reference process. Every individual, professional as well as nonprofessional, must be considered a part of the referral process. (p. 509)
> . . . .
> *Reference is the library.* (p. 510)

Rayward, 1969:

> A library takes from a bibliographical universe and transmits what it takes through its services to a particular community. (p. 317)
> . . . .
> [The] bibliographical universe consists of information being transmitted in a variety of channels. . . . [It is] a vast quantity of information, encoded in a variety of ways, being handled by a variety of organizations. (p. 322)

United Nations Educational, Scientific and Cultural Organization, 1969:

> [A] librarian is no longer merely a keeper who adds to and classifies his collections; he must now ensure that the great works published (in the form of books, records or tapes) reach the widest possible audience. Public reading depends to a large extent upon his promotional activities. . . . (p. 23)
> . . . .
> Libraries were originally places of learning where 'stocks' of books were collected, classified and preserved. To that stewardship of knowledge there has now been added the task of disseminating it. . . . The librarian becomes not so much a curator as a promoter. . . . (p. 31)

Benge, 1970:

> Librarianship [should build] on to the traditional foundations [collection, preservation, organisation, and dissemination or use] a structure called 'the organisation of knowledge', and a superstructure which enables that organised knowledge to be transmitted. (Elsewhere I have referred to these areas of librarianship as three levels of service divided according to the degree of service to the individual user.) (p. 223)

Nitecki, 1970:

> [Librarianship] is, in essence, a field dealing with mental processes, and our product is not a physical book itself, but the transmission of its content.
> . . . .
> In a broad sense, the aim of librarianship is to facilitate the transmission of ideas from recorded knowledge to the potential user by means of collecting, arranging, and distributing the carriers of information. (p. 3)

Malan, 1971:

> In our search for the science of librarianship, efforts have been made to carry the search back to the book and the library as social phenomena. But did librarianship hinge upon this or was the crux of the matter the thought expressed in the book? If it hinged on the thought and the object of library philosophy was this thought, then the question arose as to whether there was any difference between philosophy and library science. If, however, we are concerned with the transmission of the thought, then it would appear as if we were moving closer to the discovery of a central object from which a central science and the resulting practice would flow which constitutes the scientific foundation of library science. (p. 253)

Harlow, 1971:

> The library is itself composed of a number of subsystems, concerned with the acquisition and organization of information, the interface between the record and the user, retrieval and dissemination, and feedback and evaluation. The structure of the system--its framework, composition, and nature--is the process of communication which interacts at every level of operation. (p. 12)

Taylor, 1971:

> [The Shannon and Weaver] model serves as a useful conceptual framework around which we may construct a model appropriate to the graphic communication system between our authors and readers, the system which is predicated on the medium of written and printed documents. (p. 101)
> . . . .
> . . . the library is literate society's device to facilitate the system of communication between author, past and present, and readers. (p. 103)

Redmond, Sinclair and Brown, 1972:

> Figure 1 illustrates a well-known phenomenon which we shall here call the research information cycle. The stages by which research conclusions are disseminated proceed by increasing formalization. . . .
> The library is the formal repository for information in the generic sense. If the information is numeric or unpublished or ephemeral, the repository may be called a documentation or information analysis center, or data bank, but the substitution or the interpolation of an information analyst--a surrogate researcher--does not affect the form of the cycle. A library (or its kin) is central to the cycle. (p. 448)
> . . . .

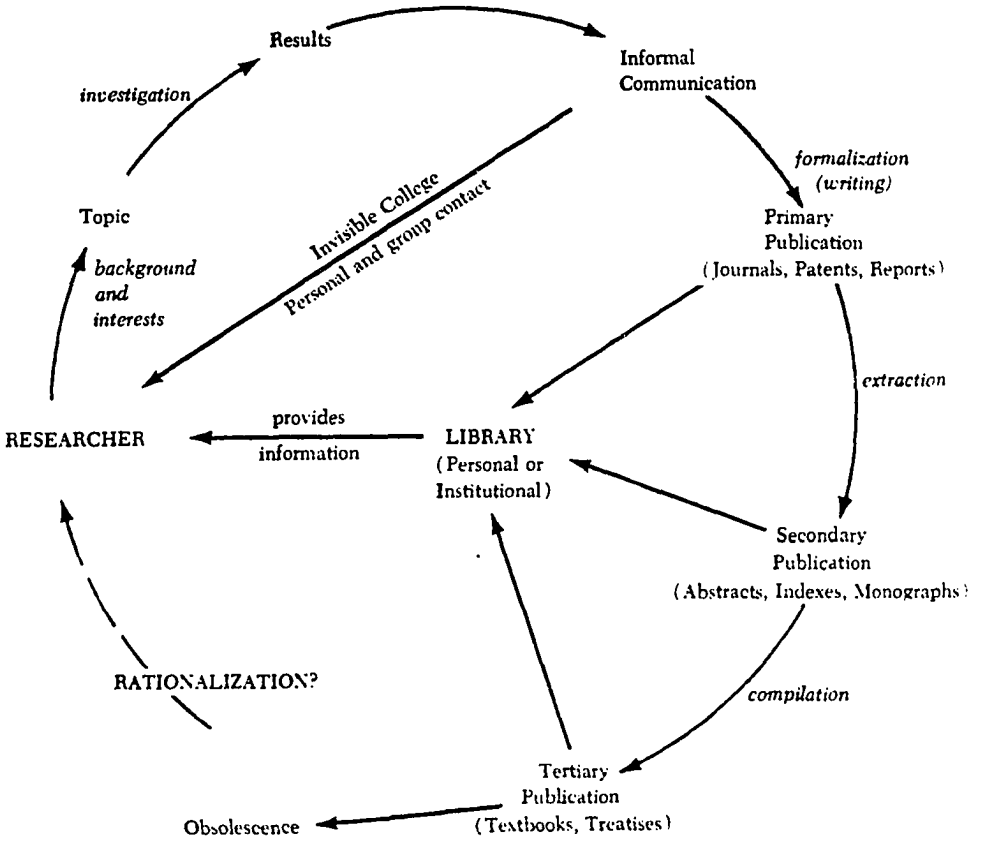


Figure 1
The Research Information Cycle:
Generation and Recycling of Information
(the Publication Cycle) (p. 449)

Shera, 1972:

> The communication process is a duality of system and message, of that which is transmitted as well as the manner of its transmission. Therefore, the librarian must see his role in the communication process as being more than a link in a chain; he must also concern himself with the knowledge he communicates, and the importance of that knowledge both to the individual and to society. (p. 110)

Johnson, 1973:

> [All] methods of conveying information might be divided into two phases, static and dynamic. . . . Today's radio new is dynamic communication and today's newspaper is static communication; yesterday's new is available only if it has been preserved. Thus the library, in its function of preserving recorded information in orderly and usable arrangement is a third and vital element of communication. (p. 9)

Smith, 1973:

> [A] human relay is a special kind of link-switch. . . . When we link two moving parts together we need to adjust their inertias to one another. A transmission is a link that makes this adjustment. (p. 317)
> . . . .
> Librarians funnel information in one direction primarily. (p. 318)

Atkinson, 1974:

> A librarian . . . *does* communicate. He classifies, arranges and displays his material and lists it in catalogues and handouts. He abstracts information and disseminates it in bulletins and journals . . . and he transmits it graphically, electronically and by personal contact. This is the information aspect of librarianship. (p. 14)

Thompson, 1974:

> Not only do libraries conserve our culture, but as agencies of communication they play an important role in its transmission. (p. 7)

Thompson, 1974:

> . . . library power arises from the connection of libraries with culture, in the intellectual and artistic sense. Libraries not only contain creative and imaginative works in literary form, but most widen their role to encompass the whole range of cultural activities. (p. 8)
> . . . .
> . . . libraries are the storehouses of knowledge and the repositories of the records of mankind's achievements and discoveries. They conserve and transmit our culture. (p. 110)

Klempner, 1976:

> [The new library school curriculum would] seek to study and analyze objectively the fundamental components and links within the total information transfer chain. . . . (p. 413)

Orr, 1977:

> [It] is assumed that the parts of a library system may be grouped into three main areas: people (staff and readers); recorded communications within the library; and buildings, furniture, and equipment (or, in reverse order, hardware, software, and humanware). (p. 4)
> . . . .
> Above all, a library is a knowledge-communicatory system which reflects man's own knowledge system. It is, therefore, a complementary feedback system which exists to encourage the

action of book meeting reader, with possible changes being effected. Because of the nature of its feedback, it is exponential in growth. Because it is a man-made system, it operates only as man manages it, but it is probabilistic in output. In some of its aspects it is competitive with other media. (p. 11)

Shields, 1977:

> The significance of that concept cannot be lost upon librarians who have traditionally been functioning as information transfer agents. Librarians have gathered up the data, stored it and waited for someone to come along who wanted to know. (p. 76)
> . . . .
> Librarians are the information transfer agents with the individual as a client. The survival of the client will be dependent upon the ability of the information transfer agent to utilize information technology. (p. 77)
> . . . .
> The role of the librarian in the new technological age is in reality the old role as it has been perceived but in reality not often achieved. (p. 78)

Musmann, 1978:

> [Proposals] of new theoretical models and critical suggestions of evolutionary alternatives to improve the quality of our daily working lives are urgently needed for the future survival of librarianship as an important and viable force in the collection, organization and dissemination of information, regardless of the degree of sophistication of such information. (p. 228)
> . . . .
> Traditionally, our role has been that of transmitters of printed information. (p. 232)
> . . . .
> [Technological] developments will have a profound effect upon libraries and their role in the information storage and retrieval processes.
> . . . .
> Perhaps, our role as transmitters of cultural values will enable us to assume a leadership role in the shaping of society's objectives although the history and record of librarianship does not provide us with much guidance or confidence in this respect. (p. 233)

Nitecki, 1979:

> Librarianship disseminates knowledge in all its forms; . . . (p. 32)
> [Knowledge is "a continuous expansion of known relations about everything around and within us" (p. 32).]
> . . . .
> [The essential metaphysical nature of librarianship is] a never-ending process of expanding knowledge by relating less-known to more familiar experiences. (p. 38)

7.4. Definitions about Objects and People: To supply

Dudgeon, 1915:

> The function of the special library is to deliver to the busy worker, ready for his use, the records of men's thoughts and work and experience, in order that there may be no duplication of experimental effort and no repetition of errors. (p. 158 in Johnson, 1915)

Johnson, 1915:

> And as in nine cases out of every ten the business man believes he is too busy to go to the library, the library simplifies matters by going to him. This is done by keeping in touch with the interests of the managerial force, directors and heads of departments, and sending them information and material that is known will be of use to them.
> . . . .
> [The special library] must be alert to anticipate the needs of its patrons. (p. 160)

Waples, 1931:

> I take it no one has to argue any longer the fact that librarianship is primarily a social enterprise; that only in so far as we know what human needs are responsive to reading can we furnish the best reading in the best way; . . . (p. 30)

Waples, 1933a:

> [Two] major functions of the modern public library: to preserve publications useful to posterity which may soon be out of print, and to supply cheaply either the current publications which the patrons prefer or those which public officials consider best for them or both. (p. 662)

United States National Roster, 1945:

> [Librarians] assist readers to find books and information best suited to their individual interests. They help children and young people in or out of school to broaden their acquaintance with books and to acquire a taste for reading. (p. 3 in Danton, 1949)

Irwin, 1949:

> [The business of librarianship] is to supply material in all conceivable fields of human knowledge. (p. 29)
> . . . .
> We now progress to that more specialised development of a librarian's duties, namely, the supply of information. (p. 79)

Butler, 1951:

> The librarian undertakes to supply literature on any and every subject to any and every citizen for any and every purpose. (pp. 246-247)

Goode, 1961:

> In the language of communications theory, the task of the librarian is to help his client separate the static from the message, to locate within the enormous surge and rush of printed and other material precisely the knowledge he needs. . . .
>
> The librarian must organize and order the flow of information. He must help others to locate it. (p. 14)

Rothstein, 1961:

> I represent reference *work* to be the personal assistance given by the librarian to individual readers in pursuit of information; . . .
> . . . .
>
> Instruction in the use of books, guidance in the choice of books, supplying information out of books--these then are the three primary colors in the reference work picture. (pp. 12-13)

Foskett, 1964:

> Librarianship is a practical activity carried on in circumstances that vary greatly, but the end is always the same: to provide readers with the books and information they need. (p. 74)

Nitecki, 1964:

> Thus, the role of the library as a social institution is to provide and to develop the means for a better book-reader relationship, in which different readers, or groups of readers, expect different kinds of books for different purposes.
>
> All of the group-interest pressures imposed on the library may be classed into one of three basic kinds: (1) requests for service, *i.e.*, to provide a given book; (2) requests for education, *i.e.*, to provide a book on a given subject; (3) requests for arbitration ["mediation" (p. 174)], *i.e.*, to provide either (a) controversial books on a given subject, or, (b) books on a controversial subject. (p. 173)

Line, 1965:

> Librarians supply books to people who want to read and consult them.
> . . . .
> [The directly functional ends of books and libraries in a community is] as purveyors of information and entertainment. . . . (p. 270)

Shaw, 1967:

> Let us go back to the purposes to be achieved by libraries, stipulating that the word "library" is used here in its generic sense--the collection, organization, and supply of intellectual resources, including all current and retrospective records of the action, spirit, and dreams of mankind, regardless of the physical form in which these occur, the intellectual level at which they are organized, or the physical form in which they are stored, manipulated, or supplied; and regardless of the purpose for which they are to be supplied or the intellectual level of the activity for which they are recalled. Stated another way, I am suggesting that we include in the generic concept all the physical forms in which man supplements his internal intellectual storage mechanism (i.e., a total intellectual storage and retrieval center) and all the levels, types, and qualities of service, for all levels and types of users, whatever their needs or purposes. (p. 2883)

Benge, 1970:

> The librarian, as librarian, provides information, . . . Information has been defined as 'knowledge put to use', . . . (p. 150)

Bryson, 1970:

> Librarianship is a social activity, which helps individuals to achieve an understanding relationship with their environment by providing them with information. The information provided ranges from that which is generally considered to be the basic knowledge of the culture, to highly specialized data useful only in specific, technical areas. (p. 30)
>
> . . . .
>
> Libraries develop as organizations designed for the purpose of satisfying subject oriented information needs felt by the parent-institution. (p. 37)
>
> . . . .
>
> The analogue to be developed here stems from three analogies which exist between the order exhibited in the theory, in the reality of librarianship, and in the geometry of Euclid. . . .
>
> Assuming the operation of . . . communications-need, within one of the many organizations within our culture, we can expect that, as the parent-organization defines its communications-needs and determines that it requires the services of a library, it also acts in accordance with . . . organizational-development and division-of-labor [to perform individual functions]. (p. 45)
>
> . . . .
>
> Because of the mechanical difficulty encountered in using large planes which intersect in so many lines as are required here, the model is conceived as discrete cells which represent the elements occuring at the intersection of the planes.

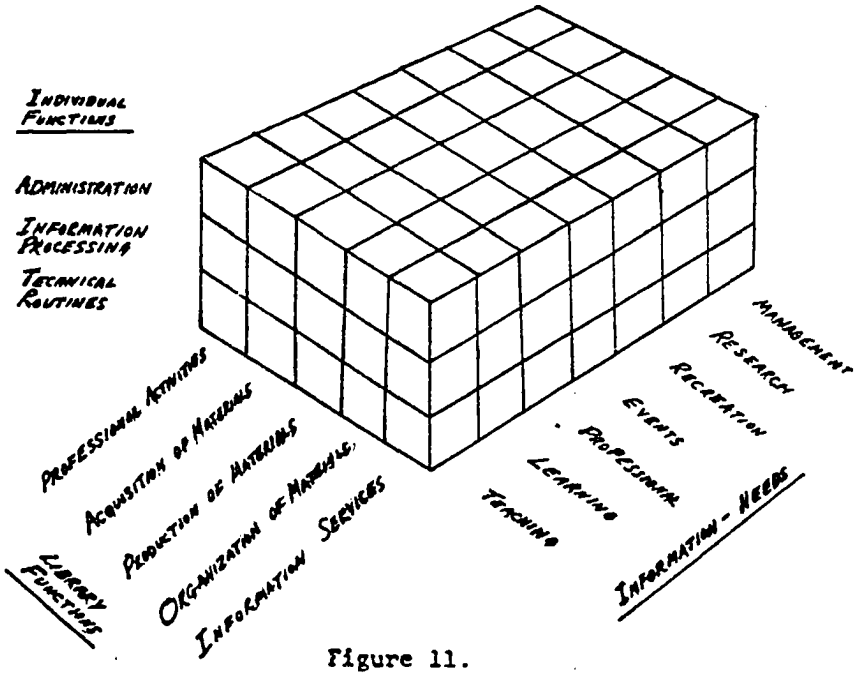


Figure 11.

The completed Interpretive Model. (p. 55)

Marco, 1971:

> [The] ideal goal of librarianship is to provide for the educational and information needs of every individual. To the extent that other agencies of society may provide for these needs, librarianship can assume a supplementary, supportive role. (p. 140)

Fairthorne, 1973:

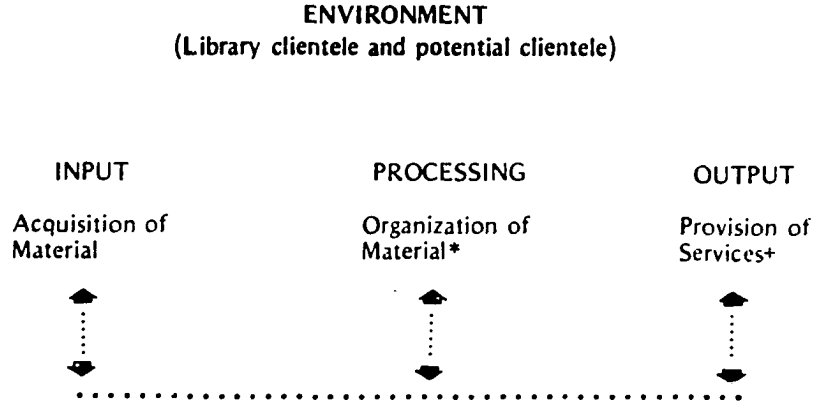
> . . . the librarians' task is to help the reader to find out what people have to say; not to expound to the reader what has been said, as a substitute for the author; not to make use of what has been said, as a substitute for the reader; not to tell the reader what he ought to read, as a substitute for God.
>
> In order to help people find out what people have said, the librarian must be knowledgeable about discourse, not what the discourse may be about, if anything. He must therefore know who writes about what, what he has written, who read it, what they think about it, what sort of words and language are used, and so forth. (p. 263)

Schultz, 1974:

> [Major] types of library or information center service include provision of documents (books, journals, pamphlets, films, audio-recordings, photocopies, interlibrary loans); furnishing of citations of documents (card catalogs, bibliographies, reading lists, verification of references); or supplying "answers" gleaned from documents (critical summaries, state-of-the-art reports, specific factual data). Viewed in relation to this system model, no differentiation need be made between libraries and information centers; it is the service that is central, . . . (p. 139)
> . . . .

FIGURE 1

Systems Model of Library Function



(p. 140)

7.5. Definitions about Objects and People: To counsel

Butler, 1933:

> . . . there must be a sympathetic understanding of that individual's motive and mental ability. Effective librarianship is largely a matter of accurate psychological diagnosis. (p. 106)

Maxfield, 1954:

> The process known as counseling is a tool of many different kinds of applied psychology, and draws on many "schools" of psychology for its philosophy, data, and techniques. It is at the heart of much student personnel work, and is the cornerstone of Counselor Librarianship.
>
> . . . .
>
> [Counseling] concerns itself primarily, and especially at the start of an interview or series of interviews, with attitudes--attitudes that block or motivate thinking and learning, and that make learning and thinking possible or impossible.
>
> . . . .
>
> Successfuly counseling leads to changes within the counselee that will enable him to make wiser future decisions, as well as to extricate himself from immediate difficulties. For this reason, couseling differs in certain respects from teaching, advisement, ccnventional library reference work, and various types of "gui ance." (p. 12)
>
> . . . .
>
> [The] counseling process sometimes may be said to involve four factors: acceptance, understanding, communication, and collaboration.
>
> . . . .
>
> The best librarians have, of course, always attempted to accept and understand, communicate with, and collaborate with, their "readers," despite the fact that they have seldom been trained as counselors. (p. 15)
>
> . . . .
>
> [Counselor librarians] attempt, in general, to carry on counseling procedures without any major preconceptions as to whether they are going to do one particular kind of counseling or another [educational, vocational, or social-emotional-personal]. (p. 16)
>
> . . . .
>
> The first level [of counseling] is the simple answering of questions, as by a clerk in a registrar's office, or at a very routine type of library information desk. The second is advisement (say) by a faculty adviser at registration time, by a health officer dealing with a problem of personal hygiene, or by a typical readers' adviser or reference librarian recommending a specific book, a group of books, or an appropriate bibliographic technique.
>
> It is at the third level that counseling as such properly belongs. . . . [It] is toward this level that the . . . Counselor Librarianship program [is operated].
>
> At the fourth level comes what has been called "clinical counseling." This activity can only be carried on by full-time psychologists with requisite graduate training and clinical experience, . . . (p. 17)
>
> . . . .
>
> Counseling, as presented in previous sections of this paper, certainly does not represent any impossibly far cry from much of the reference and readers' advisory work being done today in libraries of all types. (p. 19)
>
> . . . .
>
> Advisory Information Desk activities include reference work, readers' advisory service, and assistance toward educational, vocational and social-emotional-personal counseling, as well as library instruction questions and conferences. (p. 24)

Uphoff, 1972:

> I would expect that the profession of library science has been, is, or will be undergoing considerable reorientation, with new role definitions emerging. The role of "information counselor" proposed by Allan Hershfield appears to meet some of the expectations I would have. To the extent that information is relative, rather than absolute, there is greater need to search out that which is most suited to the situation at hand. A more active role is warranted, indeed necessary. (pp. 52-53)
>
> . . . .
>
> [Information] counselors should probably give more attention to the structuring of information and relatively less to the sources of aggregate data which have been their "stock in trade" in the past. Facts do not necessarily "speak for themselves," thus the emphasis being given to information counselors as interpreters as well as disseminators is appropriate. (pp. 53-54)
>
> . . . .
>
> [Information counselors] should define themselves more as the agents of the consumers than the producers of information. This is not to say that librarians have not viewed themselves as responsible essentially to their "clients," or that they have not pursued such responsibilities diligently. But there are subtle differences of interest between consumers and producers of information. As purveyors of the information given out by producers, information counselors are put in the role of displaying wares, of matching existing information to the needs presented. As representatives of information consumers, information counselors are prompted to convey to producers the needs of their clients and to lobby or press for information which meets existing needs. This does not require any radical changes in role but it does imply a greater degree of activism in demanding rather than simply receiving information from producers.
>
> . . . .
>
> This distinction, between consumption and production of information, also suggests that information counselors be involved in the reorientation of education to prepare people to be better consumers of information, and not just better producers. (p. 54)

Hershfield, 1973:

> [Then] let Library Science concentrate on studying human information seeking and processing behavior in different environments, human information needs and the systems whereby those needs are satisfied. (p. 15)
>
> . . . .
>
> [Practitioners] would be information counselors, capable of linking clients with the information . . . they might require. (p. 17)

7.6. Definitions about Objects and People: To advocate

Nil additional.

7.7. Definitions about Objects and People: To link

Richardson, 1927:

> [Librarianship] deals with concrete books and concrete persons. Its object is to connect the reader and the book. The unit of service is a connection: one reader, one book, once. (p. 52)
> . . . .
> It has also been suggested that its object is to connect the knowledge in books with the living knowledge in the person. It involves these two factors: the book and the person who knows the book. . . . Its object as an occupation is to help persons to know books.
>
> . . . .
> Librarianship is connecting a user and a book, or better, with the knowledge which is in a book. (p. 54)
> . . . .
> The task of librarianship in helping readers to know books is helping them to increase their energy or life, to increase their ideas or knowledge, to be sure, but not so much for information as to increase the energy itself, in short, to make more alive.
> . . . .
> [The task of the librarian] is to help them [readers], and to help anyone is to cooperate with him in carrying out his own plan or wishes, to help him to help himself. It is one-sided service. Library service is cooperation with persons who wish to know books. (p. 59)

Bishop, 1931:

> It is the duty of the librarian to introduce the men who made the books in his library--all of them--to those who seek knowledge and who seek God, . . . (p. 945)

Ranganathan, 1931:

> [The] main parts of the [library] organism that are capable of growing . . . are the books, the readers, and the staff. It is well to repeat here that a modern library is a trinity of these factors. It must be clearly realised that a collection of books without readers has no more right to be called a library than a group of readers without books and that the mere juxtaposition of books and readers without the service of a staff, that know to effect contact between the right reader and the right book, at the right time and in the right manner, cannot constitute a library either. (p. 327 in Ranganathan, 1958)

Butler, 1933a:

> [All libraries] operate by the same social method: the textual contents of books obtain general circulation in society through the mediation of individual specialists. (p. 660)

Miller, 1936:

> The library serves as a place of mediation for book and reader. (p. 298)

Waples, 1939:

> The assumptions which constitute library science are based upon differences in publications, upon differences in readers' uses for publications, and upon the interrelations of the two, which vary in time and in place. (p. ix)
> . . . .
> [The] essential values of librarianship are born of the union between readers and publications. The values are sharpened and clarified to the extent that differences among publications are intelligently adjusted to differences among readers. (p. 28)

Clayton, 1940:

> Before I entered the profession [of librarianship] I felt the onus was on librarians to bring the right person into contact with the right book. I should not have put it so concisely or so well, but I should have meant just that. (p. 28)
> . . . .
> The distribution of books is our mission. (p. 29)

Goldhor, 1942:

> [A new approach to the problem of book selection] will emphasize the individual reading situation, striving to bring the right book into contact with the right person at the right time whereas the older concept emphasizes the building of the book collection as such, . . . (p. 112)

Kolitsch, 1945:

> Librarianship . . . is primarily concerned with more than one individual and with the products of more than one individual's work. Librarianship encourages and establishes contacts between printed matter--or any other sources for conveying men's knowledge, ideas, and experiences without direct individual contact--and individual men. It is a bringing-together of men and their work. . . . [The library is] the point of contact between men and those products of men's work that consist of printed or otherwise recorded verbal, mathematical, and musical symbols. (p. 25)

Shera, 1963:

> . . . librarianship is concerned with the act of mediation between man, either individually or collectively, and his graphic records, . . . (pp. 162-163)

Slamecka and Taube, 1964:

> [The objective of librarianship] is to mediate . . . knowledge by facilitating its communication between and within individuals, societies, classes, and other echelons of mankind. . . .

Shera, 1966:

> Interpretation [or, in a library system, service] implies the strategies by means of which the wanted intellectual content is delivered to the user. . . . here is to be found the act of mediation, the true social role of the library. (p. 197)

Nitecki, 1968:

> [Library science is defined] in terms of a triadic relationship (R) between the *book* (B), the library user (U), and the relative aspect of *knowledge* (K) concerned. (p. 29)
>
> . . . .
>
> The subject matter of library science is restricted exclusively to the characteristics shared in common by a book, the subject it refers to and the particular reader in a given realm of knowledge (the shaded area in the diagram below).

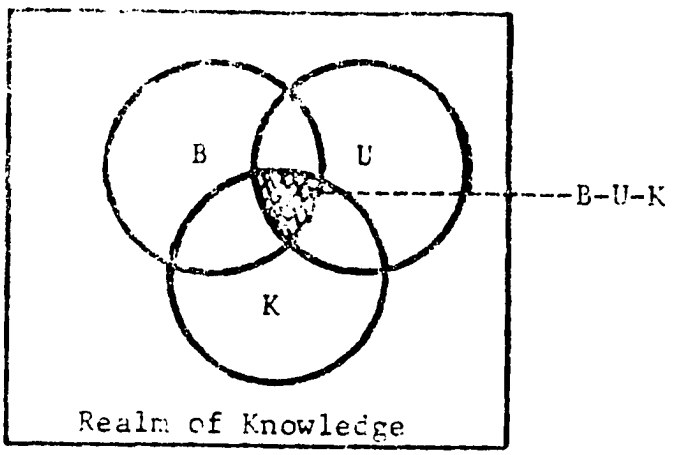


Fig. 3. The subject matter of library science. (p. 32)

> . . . .
>
> [When the librarian] attempts to relate a written work with the potential reader--then he performs a library function. (p. 32)

Harlow, 1969:

> Applying the concepts suggested by physics, the "field" of librarianship could then be tentatively described as embracing the whole range of existing knowledge and information, embedded in a larger field of action involving the production of new knowledge, learning, decision making, etc. The *structure* of the field is the *process of communication*. . . . (p. 205)
> . . . .
> . . . the following tentative sub-systems are advanced: (1) the generation, organization, and storage of the record (collection building, bibliographic organization, creating the appropriate "file" or "store"); (2) the interface between the record and user (mediation, question negotiation, identifying the character and level of information needed); (3) the retrieval of information (search strategy, finding, analyzing, and evaluating data) and its transmission; and (4) the evaluation of output in terms of satisfying users' needs in learning, decision making and human behavior, and as feed-back for systems adjustment. (p. 206)

Benge, 1970:

> The history of libraries indicates how each culture maintained itself by the preservation of records, and how libraries were an indispensable agency in bridging the gaps in time between different civilisations. The library is thus an *active* medium of communication, because without the libraries the books would not have survived. (p. 223)

Shera, 1970:

> [The librarian's] function is to serve as the mediator between man and graphic records . . . whatever contributes to the advancement of human knowledge.
> . . . .
> [The library's objective is] to bring human beings and recorded knowledge in as fruitful a relationship as it is humanly possible to be. (p. 30)
> . . . .
> Therefore the real basic problem in librarianship is to match two patterns--the pattern of human thought to the pattern of organisation of the Library. (pp. 36-37)

Foskett, 1971:

> We need to be able to vary the response of our system to cater for the kind of demand. It is also clear that relevant is a subjective factor depending on the individual; the same question, posed by two different readers, may well require two different answers. The problem arises from the fact that readers seek information which they can build into their own corpus of knowledge with the minimum of difficulty, whereas authors present

information in a context dictated by their own background; the two will not necessarily coincide exactly. We must design our [information retrieval] system to make the likelihood of achieving a match between reader's need and author's offering as high as possible, but we have to accept the fact that the match will not always be an exact one. (p. 20)

Sharify, 1972:

> Librarianship has been defined as a bridge between knowledge and the seeker of knowledge. (p. 136)

Shera, 1972:

> The librarian . . . may be said to be concerned with the interaction of human minds communicating across the barriers of space and time through the media of graphic records, . . . (p. 204)
> . . . .
> [The] function of the library is to promote the interaction of human minds through the medium of graphic records.
> . . . .
> [The] role of the librarian is one of mediation in the world of recorded knowledge, ... (p. 205)
> . . . .
> Early in the present study, the theory was developed that the social function, or role of the library, is to maximize the effective social utilization of the graphic records of civilization. (p. 359)

Wasserman, 1972:

> [The library is considered] as the medium between the information store and its user. . . . [The model] proposes a library role not typically assumed except perhaps in the case of the special library where the client is often seen to command the intermediary efforts of the librarian in order not to divert his own time and effort from the substantive problem to the search. (p. 228)

Smith, 1973:

> The complex roles of librarians, symphony conductors, stockbrokers, and many other communicators have many things in common at some times. This allows us to class them together under the single heading of relay men . . . . (pp. 314-315)
>
> . . . .
> A relay carries a message part of the way. . . . links the parts of a system together. . . .
> I find that relay men serve four basic functions. They *link store*, *stretch*, and *control*.
> . . . .

[Links] not only connect the parts of a system; they also disconnect them. They are switches, . . . (p. 316)

Second, a human relay is a special kind of link-switch. He acts between independent moving parts. . . . (p. 317)

. . . .

Relay men are not always equidistant between the people they link. Librarians are generally closer to books than to readers. Nor do relay men send information equally to one side and to the other. Librarians funnel information in one direction primarily. (p. 318)

. . . .

Linking is the first function of the relay man. This makes him a multidmensional transmission system and switch. . . .

The second function of the relay man is storing.

. . . .

Storing is like linking: it adapts and connects the parts of a system to one another. Thus, in a larger sense, the relay man holds the society together.

While linking spans the distance between two parts, storing spans the time between them. (p. 319)

. . . .

Besides linking and storing, they also stretch. . . .

Some relays amplify only signals. . . . They become relay men only when they amplify meanings.

. . . .

[We] can sometimes distinguish between signal amplification and semantic amplification. The one is simply a matter of louder or brighter, while the other is a matter of interpretation. Relay men stretch meanings--up to a point. (p. 320)

. . . .

Stretching is the quintessential problem of the relay man. He has to stretch meanings without mutilating them. He has to amplify without distorting.

. . . .

The relay man's linking, storing, and stretching are the bases for his fourth function, controlling.

. . . .

The first thing he controls is the means of linking. (p. 321)

. . . .

And through the linking the relay man supposedly controls the system. (p. 322)

. . . .

And harmonizing, conserving, and changing are all means of controlling. By regulating the transmission, the reservoir, and the interpretation, the relay man has a control of the system.

In the end he may no longer be the intermediary and helper, but the master. (p. 323)

Taylor, 1973:

[The] library might become a switching system to connect the user with other people, other places, other systems, acting primarily as a filter and negotiator in the process. (p. 460)

. . . .

> The third option [for libraries] attempts a symbiosis of man and the diversity of communication systems. . . . It utilizes the computer to produce, to control, and to manipulate records.
> . . . .
> It may be appropriate to pose the question (but not to answer) whether the library should really be a fixed place or system, whether it should not be a process--a mediator between user and knowledge, some of which is stored on shelves in a variety of forms, some available from distant people and places. (p. 461)

Mathews, 1974:

> Librarians . . . serve as conductors for others. . . . If they would be change agents, they must themselves be continuously changing, trying on and growing into new roles, and setting new priorities in using time and other resources. (p. x)

Reynolds and Danile, 1974:

> Recorded knowledge, a client, and a mediating agency are then the key elements of librarianship. (p. xv)

Khurshid, 1976:

> . . . books, ideas, information, and readers fall within the area of work of a librarian. He is essentially an important element or factor of the total communication system in a society. He is, more precisely, Marshall McLuhan's *medium* . . . . (p. 18)

Owens, 1976:

> As the final point of delivery the local library or information center may be viewed as a switchboard site, the librarian as a switchboard operator and the information consumer as a caller trying to obtain the best possible connection within the environment of a particular information item. (p. 25)

Asheim, 1977:

> . . . the core of the [librarian's] service is perceived as consisting of the same basic elements: a system that will bring recorded information to those who need and want it. (p. 155)

Lancaster, 1979:

> [In] a future electronic information environment, the library as an institution may decline in importance while the "librarian," freed from dependence upon a collection of physical artifacts, will actually gain in stature and in recognition. The librarian of the future could become an indispensable guide to a rapidly expanding universe of information resources in electronic form. (p. 342)

Lancaster, Drasgow, and Marks, 1979:

> [Increasing] diversification in the profession . . . can be thought of in terms of the "de-institutionalization" or, perhaps more accurately, the "re-institutionalization" of many information professionals. It seems undeniable to claim that, while the library as a collection of artifacts has declined substantially in importance in the past 20 years [1981-2001], the information specialist has grown considerably in stature, in recognition, and in rate of compensation. This development has occurred primarily as a result of the de-institutionalization/re-institutionalization process. Although firms of "information consultants" and even "freelance librarians" existed very much earlier, it was the 1980's before it became widely recognized and accepted that information specialists no longer needed to function within the four walls of a library--that computer terminals, in effect, gave these professionals access to vast electronic "libraries", whether they chose to work within a formal institutional environment, a private office or from their homes. (p. 56)
>
> . . . .
>
> The librarian of today [2001] has become essentially an information consultant. In the 70's librarians were intermediaries between those needing information and the electronic files. In the 80's, with the rapidly increasing availability of on-line terminals, many professionals began to conduct their own searches. They found themselves successful, however, only in those data bases that they used regularly. The explosion in the number and the diversity of electronic data bases led to increased reliance on librarians as guides to what is available in machine-readable form and as exploiters of data bases/banks unfamiliar to the scientist or other professional having need for information. (p. 71)
>
> . . . .
>
> The information professional plays an important role in "interdisciplinary linking" by searching of data bases in areas that are unfamiliar to users. (p. 72)
>
> . . . .
>
> Clearly related to their role as information consultants is the function that professional librarians now perform in "user education". Beginning in the 80's, librarians in academic and special libraries have been extremely active in instructing members of their user communities in how to exploit on-line resources effectively. (p. 73)
>
> . . . .
>
> As mentioned earlier, the most spectacular growth in the information profession has been the rapid increase in numbers of information professionals who are not affiliated with any library. This has led to some diversity in terminology. The term "librarian" has clung to those professionals who are clearly affiliated with a library, while those without such affiliation are more likely to be referred to as "information officers", "information consultants", or, simply, "information specialists". (pp. 74-75)

Wilson, 1979:

> The librarian, after analysis of user needs, will apply his or her understanding of the graphic record in order to match relevant portions of it to user needs. (p. 155)

7.8. Definitions about Objects and People: To use or maximize utility

Butler, 1933:

> [The librarian's responsibility] is to exploit those [cultural] archives for communal advantage. . . . Therefore, a major phase of the library's service to any individual reader will be to assist him to an effective method for achieving his own private purpose, so long as this is not anti-social, and to safeguard him from losing his labor in activities which are futile with reference to his own immediate desire. (pp. 105-106)

Carnell, 1934:

> It is not the advanced student but the unadvanced reader who needs that critical assistance, that exploitation of literature to serve all the purposes of life which I conceive to be genuine professional work. (p. 42)

Wheeler, 1946:

> Librarianship is concerned primarily with books and other textual materials, their discovery, selection, preparation, and, with increasing emphasis, their full utilization by all classes and individuals who have the intelligence to learn and the gumption to seek information, recreation, or self-development from them. (pp. 10-11)

Reece, 1949:

> No sharp line could be drawn between libraries . . . and various other agencies that serve as centers of intelligence. These other units are like libraries in seeking to assemble the registered results of human thought and activity and to promote the utilization of such results. (p. 1)

Shera, 1952:

> [The] social responsibility of the librarian remains the collecting, organizing, servicing, and administering of the graphic records of civilization and the encouragement of their most effective utilization, . . . (p. 10)

Egan, 1956:

> . . . the function of the library, in its collective sense, is "to maximize the effective social utilization of the graphic records of civilization." . . . The objective is to shift the point of view to that of an impartial observer of the social process, and to substitute for the librarian's own subjective value-system an objective study of what society itself expects to get from books, or graphic records, at any stage of its development or in any part of its structure. . . . What the librarian does has been described in three successive stages; he collects, he organizes, and he promotes the use of books. (p. 523)

Shera, 1961:

> Traditionally, and uniquely, the librarian has been the mediator between reader and book, between society and its graphic records; and the librarian's social objective is to maximize the utility of recorded knowledge for the greatest possible benefit to the human race. If one thinks of this function as a triangle, of which one side represents *readers*, the other *books*, or graphic records, and the base, *books and readers* it is the base that is the focus of all librarianship, . . . (p. 167)

Shera, 1961a:

> The aim of librarianship . . . is to maximize the social utility of graphic records. . . . fundamentally, librarianship is the management of knowledge. . . . The librarian is the supreme 'time-binder', and his is the most interdisciplinary of all the disciplines, for it is the ordering, relating, and structuring of knowledge and concepts. (p. 16)

Shera, 1966:

> What is the function of the library in society? I believe we will all agree that it is to maximize the social utility of graphic records for the benefit of the individual, and through the individual the improvement of society. (pp. 196-197)

Nitecki, 1968:

> [The] basic goal of librarianship: a diffusion of the existing knowledge. . . . [The] very purpose of librarianship: to collect, preserve and organize the use of recorded communications. (p. 33)

Kunze, 1969:

> [Library science is] scientific research, treatment and management of library work and its theoretical and empirical focus the book and the reader . . . development of the principles for the social utilization of materials in order to promote actively

> socialistic education, culture and economics . . . from an ideological point of view; it is the dialectical-historical materialism that forms its basis. (p. 18 in Rovelstad, 1977)

Shera, 1970:

> [The role of the librarian in society] is to maximise the utilisation of graphic records for the benefit of society. In other words, his function is to serve as the mediator between man and graphic records; not only books, the sound recordings, pictures, audio-tapes, charts, whatever contributes to the advancement of human knowledge. (p. 30)

Shera, 1972:

> The role of the library in the communication process and in the civilization that process serves is to *maximize the social utility of graphic records*.. This is the standard against which all librarianship must be judged. The key words here are *utility* and *graphic records*--use and books. Thus librarianship is bibliographic, not bibliophilic. It seeks to unite in a fruitful relationship the book and the user. (p. 194)
> . . . .
> . . . the librarian is a mediator between man and the graphic records that his and previous generations have produced, and that the goal of the librarian is to maximize the social utility of graphic records for the benefit of the humanity.
> . . . .
> It is the unique responsibility of the librarian to assemble, to organize, and to facilitate the use of graphic records, . . . (p. 197)

Reynolds and Daniel, 1974:

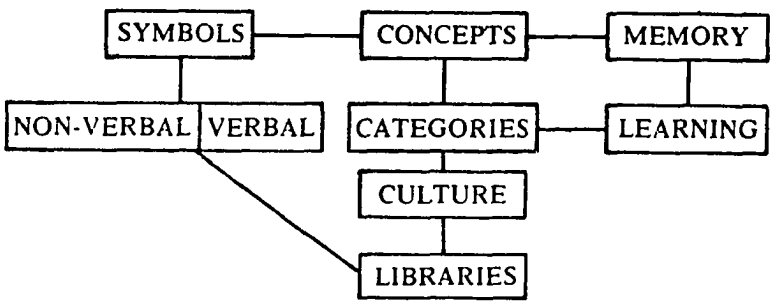
> Librarianship is a mission oriented field involving clients. It is this mission--the provision of recorded discourse to users--which provides a constant and a focus within the dynamics of change. By extension, this mission involves those intellectual and operational responses associated with the acquisition, content, and use of recorded discourse. (p. xv)

Shukla, 1974:

> The libraries now stand for storage, communication and digestion [of recorded knowledge]. (p. 7)
> . . . .
> Hence the use of the collection today leads to digestion which on its part results into extension of knowledge or Research a dynamic post war phenomenon. (p. 8)

McGarry, 1975:

> [Librarianship is] a profession engaged in the preservation and dissemination of symbols. (p. 14)
>
> . . . .
>
> Librarianship as a communication science deals with the transmission of information and its ultimate use by human beings; . . . (p. 38)
>
> . . . .
>
> Man, because of his faculty of symbolization, has a concept of events in sequence; he has a concept of time. From man's activity in a symbolic universe of his own creation comes the concept of the library; from his urge to transcend time comes the actuality of the library. This important cluster of concepts in the social foundations of librarianship can be represented as:



(p. 46)

> . . . .
> The development of language is the history of this gradual accumulation and elaboration of a special kind of symbol, the word; the development of libraries is a corollary to this social ability to store experiences for future use or further creative imaginings. (p. 47)

7.9. Definitions about Objects and People: To interpret

Nil additional.

7.10. Definitions about Objects and People: To manage

Shera, 1961:

> But librarianship as the management of knowledge is also rooted in epistemology--the knowledge of knowledge itself--and especially social epistemology, the way in which knowledge is disseminated through a society and influences group behavior.

> The library as a social invention is concerned with the improvement of the individual, but through the improvement of the individual it seeks the advancement of society. (p. 169)

Kaplan, 1964:

> The library is for society what memory is for the individual, the repository of what has already been learned, including what has been badly learned or mislearned. At any rate it is the repository of past experience. . . . A library, then, is first of all an archive, a repository in which society can find what it has already learned. (p. 9)

Mukherjee, 1966:

> As a discipline it [librarianship] comprehends both theoretic principle and technical 'know-how', suitably blended to serve social needs, its developing concepts providing a corpus of knowledge which sustains efficient management of one of the most important social institutions of our age--the library. (p. 5)
> . . . .
> Generally speaking, librarianship is an art or science of managing libraries and providing library service. (p. 31)

Caldwell, 1970:

> [The] librarians' function has been to acquire, record and generally organize this [recordable] material for use. (p. 138)

Voigt, 1970:

> As library activities cover an ever-widening field in service to the community at all levels, new methods of organizing and controlling information are being proposed and tested. (p. vii)

Greer, 1972:

> Perhaps the most important of our assumptions is the belief that librarianship is a profession that is independent of the existence of libraries for its practice. This means librarianship is more than the selection, acquisition, organization, and storage of recorded material.
> . . . .
> The central function of librarianship in this view consists of the following activities associated with the information needs of individuals:
> 1. the identification of information needs;
> 2. the determination of the proper conditions under which users will receive information to satisfy their needs;
> 3. the development of a system to provide information; and
> 4. the operation, maintenance, and continuous adjustment of the system to meet the changing environment of the parent institution or society. (p. 131)

In our view, then, librarianship consists of three major areas of concern: 1) the public or users of information; 2) information resources, regardless of form; and 3) the management and technology employed in bringing information to a user at the time, place, form, quantity, and level at which he can receive it. (pp. 131-132)

. . . .

In our judgment, librarianship is represented by the three overlapping circles [in the Venn diagram of Figure I].

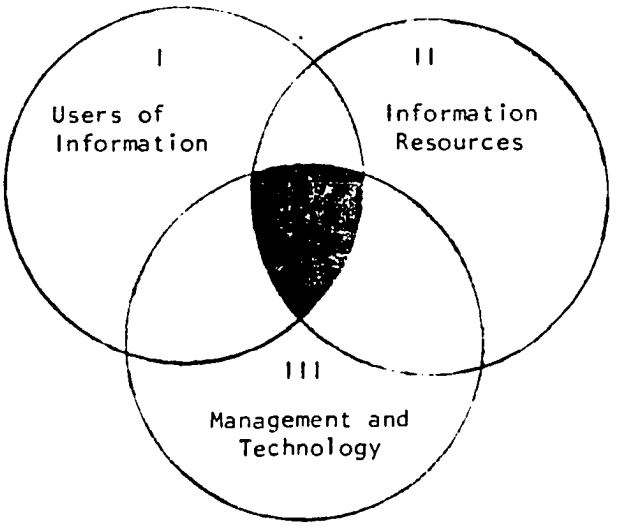
. . . .

The center area which is common to all areas of concentration is that portion of librarianship which we believe all students should experience regardless of goal. (p. 132)

. . . .

FIGURE I

A VENN DIAGRAM OF LIBRARIANSHIP



(p. 132)

Wasserman, 1972:

[Libraries] fail because they are morally and psychologically bound to physical plant and to physical objects, rather than to clienteles and to problem solving.

. . . .

It is very difficult, it may be impossible, for a conventional, passive, and complacent professional discipline to break dramatically with the past. Yet, precisely this is necessary if librarianship is to survive as anything other than a custodial function. If there is to be further development and evolution, collection development as its loftiest ideal must be challenged. (p. xi)

. . . .

> In the final analysis, perhaps the most suggestive demonstrations of prototypal variation must be sought in the real world of professional practice. The models for future professional behavior must be established in an operational context so that those who strive to revise their roles may identify, observe, and understand the implications and characteristics through examples. Such revised terms of practice may be seen in three different and yet somewhat related phenomena, all of which in their essence divert library norms and the pruposes of information practice from the institution and its aspirations to the client. The particular models selected here are those of the subject bibliographer in the academic setting, the detached or floating librarian acting out a role in response to client need, the reconstituted role of the reference librarian, and the advocate of a distinctive client group. (pp. 228-229)
>
> . . . .
>
> In all of the variable role models of prototypal forms which have been characterized, what appears to be emerging and which is yet far from being accepted is a clear shift from institutional identification to client identification. The groping has yet to be fully conceptualized, or even widely and fully articulated. (p. 232)

Shera, 1974:

> [The] composite of library work . . . is an amalgam of three basic elements, held in proper balance by <u>administration</u>, ... <u>Acquisition</u> implies knowing what to acquire and how to acquire it, . . . (pp. 156-157)
>
> . . . .
>
> <u>Organization</u> encompasses the totality of the mechanisms available to the librarian for revealing the intellectual resources, <u>content</u>, of the library's store. . . . From the record itself, organization proceeds to representations of the record as an intellectual entity--classification systems, bibliographies, indexes, abstracts, bibliographical analyses in computerized, or other mechanical forms, and the assessment of these techniques in terms of utility. (pp. 157-158)
>
> . . . .

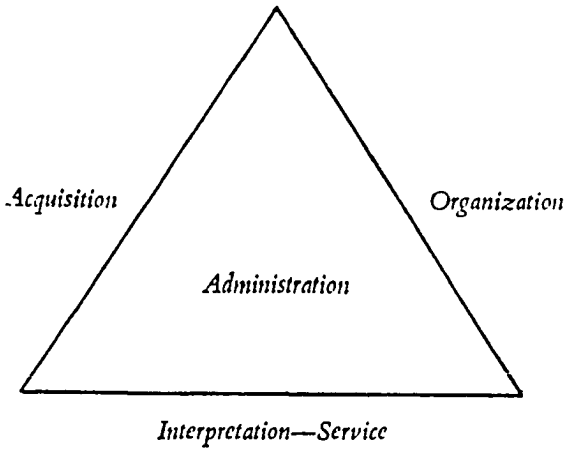


FIG. I (p. 157)

Hanks and Schmidt, 1975:

> The issue for librarianship is to identify and to create (cause to be created) the organizational setting in which the open systems model with its client-information dominance can best flourish.
> . . . .
> The body of knowledge necessary for open systems librarianship can only be delineated in general terms. (p. 184)

7.11. Definitions about Objects and People: To study

Mikhailov and Gilyarevskij, 1971:

> Library science, which studies the essence, organization and methods of public use of written and printed records, has historical ties with information. For thousands of years the techniques of information work individually carried on by every scientist as part of his work were his personal affair--never generalized and at best passed down directly from teacher to pupil. The only social institution where these techniques could find at least an indirect reflection was the library. Library science has managed over the last century and a half to generalize some of these techniques. (p. 18)

Colson, 1980:

> [Our] primary attention remains directed to the artifacts of information rather than on the ways in which people organize themselves for the generation, distribution and use of information, . . . (p. 106)
> . . . .
> We must study libraries and librarianship, rather than teach library science. We must study the ways in which people create, maintain, and use libraries. (p. 107)

APPENDIX II

ADDITIONAL DEFINITIONS ABOUT INFORMATION SCIENCE

5. Definitions about Objects

5.1. Definitions about Objects: To make accessible

American Documentation Institute, Ad Hoc Committee, 1955:

> The ad hoc committee of the American Documentation Institute selected to judge the results of the competition for a definition of documentation have announced the following awards:
> "The science of ordered presentation and preservation of the records of knowledge, serving to render their contents available for rapid reference and correlation." Dr. G. Malcolm Dyson, Loughborough, England.
> "The procedure by which the accumulated store of learning is is made available for the further advancement of knowledge." Atherton Seidell. (p. 254)

Mack and Taylor, 1956:

> *Documentation.* The group of techniques necessary for the ordered presentation, organization and communication of recorded knowledge, in order to give maximum accessibility and utility to the information contained. (p. 20)
> . . . .
> *Communication.* The disciminatory response of an organism to a stimulus. Communication occurs when some environmental disturbance (stimulus) impinges on an organism and the organism does something about it (makes a discriminatory response). If the stimulus is ignored by the organism, there has been no communication.
> *Communications.* Any integrated system for transmitting information within an organism. Also plural of "communication." (p. 19)

Perry and Kent, 1957:

> It seems reasonable to expect that an effective theory for information retrieval and correlation may provide the keystone for a general theory of documentation, which for present purposes might be defined as communication by means of graphic records. (p. vii)
> . . . .
> Documentation. The group of techniques necessary for the orderly presentation, organization and communication of recorded specialized knowledge, in order to give maximum accessibility and utility to the information contained. (p. 140)
> . . . .
> Information Retrieval. The recovering of desired information or data from a collection of documents or other graphic records. (p. 142)

Perry and Kent, 1957a:

> [Documentation] is based on a group of techniques necessary for the ordered presentation, organization and communication of recorded specialized knowledge in order to give maximum accessibility and utility to the information contained. For purposes of this analysis this group of techniques may be subdivided under the following general headings.
>
> 1. The generation of manuscripts by authors or similar preparation of the originals of other documents.
>
> 2. The distribution of documents either in toto or in abstract form to provide current awareness of recent advances. . . .
>
> 3. The storage of documents in conjunction with appropriate processing to facilitate subsequent use.
>
> 4. The retrieval of documents from storage to provide information needed in connection with current problems and situations. (p. 80)

Shamurin, 1958:

> [Documentation:] collection, storage, organization and bibliographic presentation of various kinds of documents, facilitating their retrieval for scientific and informational purposes.
>
> . . . .
>
> Collection of various printed, written, graphic and other materials, their preservation, systematization and bibliographic presentation, making them easily accessible for scientific, research and information purposes. (quoted by Dembowska, 1968, p. 14)

Vickery, 1958:

> Information storage and retrieval in the wide sense covers . . . [four] basic operations in the effective use of graphic records (documents), to store information and make it available, . . : A, recording information in documents; B, storing recorded information--documentary items; C, identifying items containing information relevant to a given problem, situation, or subject; D, providing the identified items from storage. (p. 1275)

Wagner, 1959:

> Documentation, n. (1) The science of collecting, storing and organizing recorded informational materials or documents for optimum acess and specificity. (2) 'Includes the activities which constitute special librarianship plus the prior activities of preparing and reproducing materials and the subsequent activity of distribution.' Mortimer Taube. (3) 'Selection, classification, and dissemination of information.' Henri Lemaitre. (4) 'The science of ordered presentation and preservation of the records of knowledge, serving to render their contents available for rapid reference and correlation.' Dr. G. Malcolm Dyson. (5) 'The <u>procedure</u> by

> which the accumulated store of learning is made available for the further advancement of knowledge.' Atherton Seidell. (6) 'The art of facilitating the use of recorded, specialized knowledge through its presentation, reproduction, publication, dissemination, collection, storage, subject analysis, organization, and retrieval.' Mrs. Helen Brownson. (p. 13)

Harrod, 1959:

> Documentation. The act of collecting, classifying and making readily accessible the records of all kinds of intellectual activity. (p. 105)
> . . . .
> Record. A document preserving an account of fact in permanent form. (p. 227)

Conference on Training Science Information Specialists, 1962:

> *Information science.* The science that investigates the properties and behavior of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. The processes include the origination, dissemination, collection, organization, storage, retrieval, interpretation, and use of information. The field is derived from or related to mathematics, logic, linguistics, psychology, computer technology, operations research, the graphic arts, communications, library science, management, and some other fields. (p. 115)
> . . . .
> *Information scientist.* One who studies and develops the science of information storage and retrieval, who devises new approaches to the information problem, who is interested in information in and of itself. (p. 114)
> . . . .
> *Documentation and documentalist.* We have avoided use of these two terms because of the wide variation in their use and in the numerous interpretations of their meaning. We suggest, therefore, if anyone should wish to use these terms he should state his particular definition. (p. 116)

Taylor, 1962:

> [Documentation and information science:] As a science, it investigates the structure, properties, and transmission of information, cutting across such sciences as psychology, logic, neurophysiology, linguistics, and mathematics. As a technology, it is concerned with the means of processing information for optimum accessibility and use, utilizing the techniques of computer technology, librarianship, systems research, and the management sciences. (p. 3)
> . . . .

Information Science-- The science that investigates the properties and behavior of information and the forces governing the flow of information. (p. 8)

Cheydleur, 1965:

The scale of activity in Information Science and Retrieval [is] unique in the twentieth century, . . . The immediate availability throughout the world of all information files [by means of computers] will engender continual review and evaluation in the scientific spirit that welcomes reexamination of any data without fear. In liberal education, there must be a responsibility to prepare minds for this regimen in the world of scholarship of the 1970's, . . .

. . . .

The linkage between information science and liberal education is so obvious, and yet so unexplored at the present time, that the prospects are a matter of conjecture. (p. 171)

Williams, 1965:

Documentation. (1) The science of collecting, storing and organizing recorded informational materials or documents for optimum access. (2) Includes the activities which constitute special librarianship plus the prior activities of preparing and reproducing materials and the subsequent activity of distribution. (3) Selection, classification, and dissemination of information. (4) The science of ordered presentation and preservation of the records of knowledge serving to render their contents available for rapid reference and correlation. (5) The procedure by which the accumulated store of learning is made available for the further advancement of knowledge. (6) The art of facilitating the use of recorded, specialized knowledge through its presentation, reproduction, publication, dissemination, collection, storage, subject analysis, organization, and retrieval. (7) Collection and conservation, classification and selection, dissemination and utilization of all information. (p. 409)

. . . .

Information Processing. Usually a less restrictive term than data processing, encompassing the totality of scientific and business operations performed by a computer. (p. 414)

Evans, 1966:

Documentation. The science of collecting, storing and organizing recorded informational materials or documents for optimum access. Includes the activities which constitute librarianship plus the prior activities of preparing and reproducing materials and the subsequent activity of distribution. Selection, classification, and dissemination of information.

The science of ordered presentation and preservation of the records of knowledge serving to render their contents available for rapid reference and correlation.

> The procedure by which the accumulated store of learning is made available for the further advancement of knowledge.
>
> The art of facilitating the use of recorded, specialized knowledge through its presentation, reproduction, publication, dissemination, collection, storage, subject analysis, organization, and retrieval.
>
> Collection and conservation, classification and selection, dissemination and utilization of all information. (p. 25)
>
> . . . .
>
> Information science. The science that studies creation, management, and exploitation of recordable knowledge. The theoretical basis for the field of documentation. (See also documentation)
>
> . . . .
>
> Information processing. Usually a less restrictive term than data processing, encompassing the totality of scientific and business operations performed by a computer in processing data that represents information.
>
> . . . .
>
> Information retrieval. The methods and procedures for recovering specific information from stored data. (p. 35)

Borko, 1967:

> Information science studies the properties and behavior of information, the forces governing the flow of information, and the means of processing it for optimum accessibility and usability. (p. 121)

Taylor, 1967:

> [Information science] investigates the properties and behavior of information, the forces governing the transfer process, and the technology necessary to process information for optimum accessibility and use. Its interests include information representations in both natural and artificial systems, the use of codes for efficient message transmission, storage, and recall, and the study of information processing devices and techniques such as computers and their programming systems.
>
> It is an interdisciplinary field derived from and related to mathematics, logic, linguistics, psychology, computer technology, operations research, librarianship, the graphic arts, communications, management, and similar fields. It has both a pure science component, which inquires into the subject without regard to applications, and an applied science component, which develops services and products. (from a letter to the membership of the American Society for Information Science by its president, quoted by G. Jahoda, 1969, p. 331; also quoted by Atherton and Greer, 1968, fn. 1, p. 330)

Artandi, 1968:

> While there have been attempts to define documentation, a term which has become largely synonymous with information science and technology, none of the definitions have been accepted generally. Documentation has been called "librarianship in high gear" and "the group of techniques necessary for the ordered presentation, organization, and communication of recorded (specialized) knowledge in order to give maximum accessibility and utility to the information contained." [latter quotation from Allen Kent, "Documentation," Library Trends, October, 1961] (p. 7)

Dembowska, 1968:

> [The] terms "documentation and scientific information", "documentation", and "scientific information" will be used interchangeably in defining the entire field with which we are concerned. (p. 22)
>
> . . . .
>
> [The] subject of our deliberations will be documentation and scientific information understood as an organized activity, whose goal is to make accessible the achievements of science and practice, in order that they may be utilized for further promotion of science or for ameliorating practical activity in all fields. (p. 23)
>
> . . . .
>
> Documentation is the transfer of information through the medium of documents; . . . (p. 111)
>
> . . . .
>
> The task of the theory of scientific information is to investigate the process of the flow of information, to discover the failures appearing at individual stages of this process and to indicate the means for eliminating such failures.
>
> . . . .
>
> The process of the transfer of information . . . can be investigated from both directions . . . starting from the item of information, and the opposite way--starting from the user. (p. 113)

Schlueter, 1968:

> Information science--That discipline which investigates the properties and behavior of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. It includes the origination, dissemination, collection, organization, storage, retrieval, interpretation, and use of information.
> Information scientist--One who studies and develops the science of information, who devises new approaches to the information problems, and who is interested in information in and for itself. (p. 152)

Fujikawa, 1969:

> In short, documentation may be said to refer to the totality of techniques, or technological achievements, relating to access to

all sorts of recorded materials, and it is, of course, the techniques which make the needed information available. (p. 114)

International Business Machines, 1969:

. . . .
Information processing. (ISO). (See "data processing".) (p. 28)
. . . .
Data processing. (ISO). The execution of a systematic sequence of operations performed upon data. (Synonymous with "information processing".)
. . . .
Data management. A general term that collectively describes those functions of the control program that provide access to data sets, enforce data storage conventions, and regulate the use of input/output devices. (p. 27)

Weik, 1969:

Documentation--The process of collecting, organizing, storing, citing, indexing, retrieving, and disseminating documents or their contents. Documentation involves a group of techniques necessary for orderly presentation, organization, and communication of recorded specialized information in order to give maximum accessibility and utility to the information contained in documents. (p. 115)
. . . .
Retrieval, data--The searching, selecting, and retrieving of actual data contained in a file; . . .
Retrieval, document--The indexing, searching, and identification of specific documents that contain desired data concerning a matter of interest. (p. 249)
. . . .
Retrieval, information--The recovery and interpretation of stored data, including the procedures, techniques, and related activities involved, such as the selection and utilization of storage devices, the preparation of store and search routines, data mechanization, the indexing of stored data, and the coding of data. It is necessary to distinguish between document retrieval and actual data retrieval. (p. 250)

Hayes and Becker, 1970:

Documentation. In the computer field, the records which describe the purpose, structure, operation, and use of computer programs. In the context of information systems for science and technology, the process of acquiring reports and journals, indexing them, and making them available. (p. 799)
. . . .
Information retrieval. The process of finding desired data in a file. (p. 802)

Harrod, 1971:

> Documentation. 1. The act of collecting, classifying and making readily accessible the records of all kinds of intellectual activity. 2. The recording of knowledge and the sources of knowledge, organizing such records systematically so that they may be found quickly, and disseminating by various means both the knowledge and the sources of the knowledge. 3. The recording, organization and dissemination of specialized knowledge (Aslib). 4. The science of collecting, storing and organizing recorded informational materials or documents for optimum access. 5. Includes the activities which constitute special librarianship plus the prior activities of preparing and reproducing materials and the subsequent activity of distribution. 6. The selection, classification and dissemination of information. 7. The science of ordered presentation and preservation of the records of knowledge serving to render their contents available for rapid reference and correlation. 8. The procedure by which the accumulated store of learning is made available for the further advancement of knowledge. 9. The art of facilitating the use of recorded, specialized knowledge through its presentation, reproduction, publication, dissemination, collection, storage, subject analysis, organization, and retrieval. 10. Collection and conservation, classification and selection, dissemination and utilization of all information (IBM). 11. The designation of the total complex of actvities involved in the communication of . . . specialized information . . . including the activities which constitute special librarianship plus the prior activities of preparing and reproducing materials and the subsequent activity of distribution. (Mortimer Taube) 12. The group of techniques necessary for the ordered presentaiton, organization and communication of recorded specialized knowledge, in order to give maximum accessibility and utility to the information contained. (J.D. Mark (sic) and R.S. Taylor) 13. The identification, the investigation, the assembling and the use of documents (French Union of Documentation Services). (pp. 223-224)
>
> . . . .
>
> Information Retrieval. Finding documents, or the information contained in documents, in a library or other collection, selectively recalling recorded information. (p. 329)
>
> . . . .
>
> Information Work. The collection, evaluation and organized dissemination of scientific and technical information. It includes (a) abstracting technical writings; (b) translating same; (c) editing the products of (a) and (b); (d) indexing, subject classification and retrieval of information; (e) searching literature, preparing bibliographies, reports, etc.; (f) obtaining, providing, and advising on scientific and technical information; (g) disseminating information; (h) research on problems in information work. (p. 330)
>
> . . . .
>
> Data Processing. Recording information by some means whereby it (or only some of that stored on the same record) may be obtained immediately by some mechanical or semi-mechanical process. There are two basic modes of data processing: conventional and inverted.

> Documentation. The group of techniques necessary for the orderly presentation, organization and communication of recorded specialized knowledge, in order to give maximum accessibility and utility to the information contained. (p. 140)
> . . . .
> Information Retrieval. The recovering of desired information or data from a collection of documents or other graphic records. (p. 142)

Shamurin, 1958:

> [Documentation:] collection, storage, organization and bibliographic presentation of various kinds of documents, facilitating their retrieval for scientific and informational purposes.
> . . . .
> Collection of various printed, written, graphic and other materials, their preservation, systematization and bibliographic presentation, making them easily accessible for scientific, research and information purposes. (quoted by Dembowska, 1968, p. 14)

Taube and Wooster, 1958:

> A storage and retrieval system is an organized method of putting items away in a manner which permits their recall or retrieval from storage. . . . [It] must be considered as a single system and not as a storage system plus a retrieval system. . . . [The] method of storage determines to a considerable extent the possibilities of retrieval. Contrariwise, the requirements of retrieval establish the range of methods of storage. (p. 15)

Booth and Wadsworth, 1960:

> A documentation system is a complex pattern of interacting and interdependent processes which facilitates the use of recorded specialized knowledge through its presentation, reproduction, publication, dissemination, acquisition, characterization, storage, and retrieval. (p. 5)
> . . . .
> In theory, no single documentation process should be overlooked by the documentalist engaged in designing or operating a documentation system. Ideally, the documentalist should endeavor to establish some control over all of the processes of documentation if he is to deal with a coherent whole, i.e. a system. However, in actual practice, in the majority of documentation situations, we believe the processes of documentation may be divided into two categories. On the one hand there are those processes over which the documentalist actually exercises little or no control. These include the four processes of presentation, reproduction, publication, and dissemination. On the other hand, there are those processes over which the

> In the conventional mode, an 'item record' (which may be a punched card, section of a magnetic tape or magnetic disc) bears a number of codes representing characteristics describing the 'item of information' which may be a document, test, sale or employee. In the inverted data processing mode the process is reversed, 'items of information' being stored on records reserved for recognized characteristics. (pp. 200-201)

Hines and Harris, 1971:

> Information Science - A vexed and vexing area. Depending, it seems, at least partly on antecedents of the person defining the term, information science may be part of librarianship, librarianship may be part of information science, or the two may be completely separate. Operationally, the term is usually used to refer to the development and provision, generally using newer technologies, of intensive information services which in the past have been offered by libraries, but only sporadically and not as their major mission. (p. 23)
> . . . .
> Documentation - 1) Collection, storage, and organization of recorded information or documents for optimum access. 2) Facilitation of the use of recorded knowledge by appropriate organization, storage, and retrieval. 3) A record in English of the steps performed by a computer program. (p. 16)

5.2. Definitions about Objects: To retrieve

Mack and Taylor, 1956:

> Retrieval. The process of locating and selecting data relevant to a given information requirement. (p. 24)

Mooers, 1956:

> Information retrieval is concerned with the finding of information. Its problems can usually be considered quite apart from matters of how the documents containing the information are stored. (p. 3)

Perry and Kent, 1957:

> It seems reasonable to expect that an effective theory for information retrieval and correlation may provide the keystone for a general theory of documentation, which for present purposes might be defined as communication by means of graphic records. (p. vii)
> . . . .

documentalist can and actually does exercise a high degree of control. These processes are acquisition, characterization, storage, and retrieval. (pp. 5-6)

Mooers, 1960:

> [Information] retrieval is concerned with more than the mere finding and providing of documents; we are already concerned with the discovery and provision of information quite apart from its documentary form. To encompass future developments . . . even this broad view of information retrieval will have to be modified and extended . . . [to include] the introduction of machine methods to information retrieval, . . . (p. 229)

Aspnes, 1962:

> It is difficult to define "documentation" much less describe it, but for our general purpose we might use "The art, science and/or technique for collecting, evaluating, storing, indexing, retrieving and disseminating recorded information; and methods and devices for improving the efficiency of this work." (p. 161)
> . . . .
> [Most] of the activitiy in the field of documentation aims at 1) providing better methods for scanning (including translating and abstracting) the world literature on any subject, and 2) providing a means for storing, indexing and retrieving all the pertinent literature on any particular subject so that any question can be answered quickly and with the highest possible degree of accuracy and completeness. (p. 162)

Cuadra, 1964:

> Although the term [information science] is, as Mooers has observed, more an expression of hope than an accurate description of the documentation field, there seems to be little doubt that many of the activities we presently describe as library science, documentation, linguistics, information storage and retrieval, machine translation, and information system engineering are coalescing into a new profession and perhaps a new science. Whichever it is, it will deal with information about information--its origin, its characteristics, and the mechanisms people have devised to communicate, store, and recover it. (p. 289)

Schweizer, 1964:

> The most naive definition of documentation and information-retrieval is that the first deals with documents while the second deals with information. No matter how ridiculous and infantile this may seem, it still is nearer the truth than any more sophisticated approach; for

these disciplines differ and find expression in the matters they deal with. (p. 23)
. . . .
[As] soon as information (contents transfer) has taken place, information ceases to exist. Yet information can be analoguely expressed--for instance, by the arrows between the blocks of a flowchart. In computers information exists as electricity.
. . . .
[Deducing] from the fact that information is content-transfer, retrieval of content-transfer amounts to tracing information and making its apprehension possible at any point in its course. It is defining how and where information exists. In easier terms we may borrow the expressions 'analysis' and 'design' from the computer people. Thus in reality information-retrieval is systems-logic and logic of apparatus and circuitry. The documentalist is concerned with the first. (p. 24)

Cheydleur, 1965:

Information Retrieval: the process which discovers and names particular information-bearing records having specified subject or bibliographic characteristics and then provides access to copies of such documents.
Information Retrieval System: an integrated activity which performs information retrieval and which includes all the necessary supporting activities to provide a complete service; i.e., it includes acquisition, cataloging, extraction, retrieval, copying and, in addition, the personnel and organizational interactions leading to the intersystem cooperation and to system evolution. (p. 171)

American Standards Association, 1966

Documentation. The collecting, organizing, storing, citing, and disseminating of documents or the information recorded in documents. (p. 15)
. . . .
Information Retrieval. The methods and procedures for recovering specific information from stored data. (pp. 17-18)
. . . .
Document. (1) A medium and the data recorded on it for human use, e.g., a report sheet, a book. (2) By extension, any record that has permanence and that can be read by man or machine. (p. 15)
. . . .
Information. The meaning assigned to data by known conventions. (p. 17)

Arnold, Hill, and Nichols, 1966:

Information retrieval. The methods and procedures for recovering specific information from stored data. (p. 313)
. . . .
Data processing. Any operation or combination of operations on data to achieve a desired result. (p. 311)
. . . .

> In its broadest sense, data processing refers to the recording and handling that are necessary to convert data into a more refined or useful form. In the past these tasks were referred to as record keeping or paperwork. (p. 1)

Lipetz, 1966:

> The field of information storage and retrieval is thus concerned with methods of creating and managing collections of records to facilitate the recovery of pertinent records as they are needed. (p. 174)
>
> . . . .
>
> Correspondence files, accounting systems, inventory-control systems, directories--all are information storage and retrieval systems. So are collections of cooking recipes or of amateur color slides. Even the ubiquitous dictionary, as well as the index to a book or a journal, is an example of information storage and retrieval systems. All these examples are comprised of records to which one may address a variety of allowable questions (that is, questions within the intended scope of the collection) with a reasonable expectation of retrieving a selection of records in response to each question. (p. 176)
>
> . . . .
>
> Operationally . . . all such systems employ only three basic processes: the analysis of records, the derivation of new records from old ones and the physical displacement of records over a distance. Analysis is the central ingredient that determines whether and how new records should be created and whether existing records should be transferred or transmitted. (p. 177)

Sippl, 1966:

> Information retrieval--1. A method for cataloging vast amounts of data, all related to one field of interest, so that you can call out any or all of this data at any time it's needed with accuracy and speed. 2. A branch of computer science relating to the techniques for storing and searching large or specific quantities of information that may or may not be a real-time system.
>
> . . . .
>
> Information-retrieval system--A system for locating and selecting, on demand, certain documents or other graphic records relevant to a given information requirement from a file of such material. Examples of information-retrieval systems are classification, indexing, and machine searching systems. (p. 89)

Stolk, 1966:

> Information Retrieval - the recovery of data from a collection for the purpose of obtaining information. Retrieval includes all the procedures used to identify, search, find and remove specific information or data stored. It excludes both the creation and the use of the data. (p. 19)

. . . .
Information Retrieval System - a system for locating and selecting, on demand, certain documents, or other graphic records, relevant to a given information requirement from a file of such material. (p. 20)

Borko, 1967:

> Information science studies the properties and behavior of information, the forces governing the flow of information, and the means of processing it for optimum accessibility and usability. It is an interdisciplinary science using the skills and knowledge of logicians, mathematicians, linguists, librarians, computer programmers, engineers, and behavioral scientists. (p. 121)
>
> The exponential increase in the amount of scientific and technical documentation, and in the need for people to be aware of advances in science and technology, is providing the impetus for growth in information science. . . . The task of information science is to re-examine existing methods of acquiring, storing, indexing, and retrieving information in the light of advanced technology and to derive new concepts and principles that can be used in the design of more efficient information storage and retrieval systems. (pp. 121-122)

Chapman and St. Pierre, 1970:

> Documentation, the group of techniques necessary for the orderly presentation, organization and communication of recorded specialized knowledge, in order to maintain a complete record of reasons for changes in variables. Documentation is necessary not so much to give maximum utility as to give an unquestionable historical reference record. (p. 8-21)
> . . . .
> Retrieval, information, the recovering of desired information or data from a collection of documents or other graphic records. (p. 8-48)
> . . . .
> System, information retrieval, a system for locating and selecting, on demand, certain documents, or other graphic records relevant to a given information requirement from a file of such material. (p. 8-56)

Hayes and Becker, 1970:

> Documentation. In the computer field, the records which describe the purpose, structure, operation, and use of computer programs. In the context of information systems for science and technology, the process of acquiring reports and journals, indexing them, and making them available. (p. 799)
> . . . .
> Information retrieval. The process of finding desired data in a file. (p. 802)

International Federation for Documentation, 1970:

> [Documentation] includes, inter alia, the organization, storage, retrieval, dissemination and evaluation of information however recorded, in the fields of science, technology, social sciences, arts and humanities. (quoted by Arntz, 1974, p. 390)

Sippl and Sippl, 1972:

> Document retrieval--The system of searching, indexing, and identifying of specific documents which contain the desired data being sought. (p. 152)
> . . . .
> Information retrieval--1. A method for cataloging vast amounts of data, all related to one field of interest, so that you can call out any or all of this data at any time it's needed with accuracy and speed. 2. A branch of computer science relating to the techniques for storing and searching large or specific quantities of information that may or may not be a real-time system. (p. 212)

Institute of Information Scientists, 1973:

> Information Retrieval, systems used to locate, select and recover information when required, from stored data using search, classification and indexing techniques.

Saracevic, 1976a:

> A discipline is defined by the problems it attacks. At the turn of the century documentation defined the problems in scientific and technical communication as associated with the organization of knowledge and control of its records. As a result of this definition we had the development of massive indexing and abstracting services and of UDC. Following World War II, the problem was defined to be at the other end of the communication process, that concerned with retrieval and dissemination. As a result we saw the development of information retrieval (IR) systems and massive applications of information technology. The new definition and resulting approach to the problem differed sufficiently from those in documentation so that a new discipline emerged in the early 1960's--information science. (p. 17)

American National Standards Committee, 1977:

> Information retrieval: (1) (ISO)*The action of recovering specific information from stored data. (2) (ISO) Methods and procedures for recovering specific information from stored data.
> . . . .
> Information processing: (ISO) Synonym for data processing. (p. 76)
> . . . .

Data processing: (ISO) The execution of a systematic sequence of operations performed upon data, e.g., handling, merging, storing, computing. Synonymous with information processing. (p. 42)

* International Organization for Standardization

Paice, 1977:

The purpose of Information Retrieval is simply to obtain relevant answers to questions.

. . . .

All information, if it is to be available for retrieval, has to be held in some sort of store, which we will refer to rather vaguely as a 'data-store'. The problem is how to organise this data-store so that any required information may be obtained quickly and accurately, and also how to present this information in a useful form. (p. 1)

Davis and Rush, 1979:

Information science is an interdisciplinary field concerned with all phases of the information transfer process. (p. 3)

. . . .

As an interdisciplinary field, it [information science] can be viewed as a spectrum of activities ranging from information theory through information technology to service-oriented functions, such as library and information center management. (p. 4)

. . . .

A system for information storage and retrieval can be thought of as a special case of the general communication system in which the processes are especially independent of time. (p. 61)

. . . .

Usually when people speak of information retrieval, they mean document retrieval; this is natural, because information is stored in documents, which are then usually indexed and/or classified to facilitate their retrieval. (p. 64)

International Business Machines, 1981:

Information retireval (IR). (TC97) Actions, methods, and procedures for recovering stored data to provide information on a given subject.

. . . .

Information retrieval system. A computing system application designed to recover specific information from a mass of data. (p. 205)

5.3. Definitions about Objects: To transfer

International Institute of Documentation, 1931:

> [Documentation:] collection, classifying and distribution of records of any kind. (quoted by Dembowska, 1967, p. 57, from Guide de la Fédération Internationale de Documentation, 1931)

Majewski, 1951:

> [Documentation encompasses] a complex of activities aiming at assigning various documents to a given problem and dissemination of information on these documents. The component activities are: 1) collection of documents, 2) their documentational presentation, 3) dissemination of information on documents (or of documents proper) and information service. (quoted by Dembowska, 1968, p. 14)

Bishop, 1953:

> Documentation has to do with the communication of information and knowledge across the barriers of time and distance. Such communication may be kept in any of several media, for example, film, sound recording, the printed page, or microreproduction. One assumption, however, is that records are kept. Thus the telephone would not ordinarily be thought of as a documentation instrument. (p. 54)

Thompson, 1953:

> [Documentation:] selection, classification and dissemination of information; bibliographic control (amerc.) (p. 138)

Perry and Kent, 1957:

> It seems reasonable to expect that an effective theory for information retrieval and correlation may provide the keystone for a general theory of documentation, which for present purposes might be defined as communication by means of graphic records. (p. vii)
> . . . .
> Documentation. The group of techniques necessary for the orderly presentation, organization and communication of recorded specialized knowledge, in order to give maximum accessibility and utility to the information contained. (p. 140)
> . . . .
> Information Retrieval. The recovering of desired information or data from a collection of documents or other graphic records. (p. 142)

Perry and Kent, 1957a:

> [Documentation] is based on a group of techniques necessary for the ordered presentation, organization and communication of recorded specialized knowledge in order to give maximum accessibility and utility to the information contained. For purposes of this analysis this group of techniques may be subdivided under the following general headings.
>
> 1. The generation of manuscripts by authors or similar preparation of the originals of other documents.
> 2. The distribution of documents either in toto or in abstract form to provide current awareness of recent advances. . . .
> 3. The storage of documents in conjunction with appropriate processing to facilitate subsequent use.
> 4. The retrieval of documents from storage to provide information needed in connection with current problems and situations. (p. 80)

Evans and Farradane, 1958:

> Documentation has been defined as the recording, organization, and dissemination of knowledge. (p. 1489)

Verhoef, 1960:

> [The] three main functions of documentation are: to collect, to order and to disseminate. (p. 193)

Turner, 1961:

> Documentation. The systematic collection, classification, recording, storage, and dissemination of specialized information, generally of a technical or scientific nature. (p. 56)

Aspnes, 1962:

> It is difficult to define "documentation" much less describe it, but for our general purpose we might use "The art, science and/or technique for collecting, evaluating, storing, indexing, retrieving and disseminating recorded information; and methods and devices for improving the efficiency of this work." (p. 161)
> . . . .
> [Most] of the activitiy in the field of documentation aims at 1) providing better methods for scanning (including translating and abstracting) the world literature on any subject, and 2) providing a means for storing, indexing and retrieving all the pertinent literature on any particular subject so that any question can be answered quickly and with the highest possible degree of accuracy and completeness. (p. 162)

Kaula, 1962:

> Documentation has been defined as a process of location, collection, ordered presentation, and communication of literature, with emphasis on micro-documents. It was during the turn of the present century, that bibliographers began to pay attention to micro-thought, that is, articles and other information contained in periodicals. Earlier to that, bibliographers were concerned merely with macro-thought, that is, documents as a whole. (p. 9)
> . . . .
> Documentation as a term denoting "micro-bibliography", was first started by the French [sic] who felt that bibliography had long been associated with macro-documents; and micro-documents could not, therefore, be within its hold. (p. 10)

Taylor, 1962:

> [Documentation and information science:] As a science, it investigates the structure, properties, and transmission of information, cutting across such sciences as psychology, logic, neurophysiology, linguistics, and mathematics. As a technology, it is concerned with the means of processing information for optimum accessibility and use, utilizing the techniques of computer technology, librarianship, systems research, and the management sciences. (p. 3)
> . . . .
> Information Science-- The science that investigates the properties and behavior of information and the forces governing the flow of information. (p. 8)

Cuadra, 1964:

> Although the term [information science] is, as Mooers has observed, more an expression of hope than an accurate description of the documentation field, there seems to be little doubt that many of the activities we presently describe as library science, documentation, linguistics, information storage and retrieval, machine translation, and information system engineering are coalescing into a new profession and perhaps a new science. Whichever it is, it will deal with information about information--its origin, its characteristics, and the mechanisms people have devised to communicate, store, and recover it. (p. 289)

Mohajir, 1965:

> The word "documentation" can be defined as the systematic organization of documents including their collection and dissemination. (p. 17)

Landau, 1966:

> Documentation (see Landau, 1958).
> . . . .
> Information work is distinct from librarianship and should in no way be confused with it. It is defined as the collection, collation, evaluation and organized dissemination of scientific and technical information, which includes such practices as (1) abstracting, reviewing progress and other similar technical writing; (2) translating scientific and technical writings; (3) editing such writings as emerge from (1) and (2); (4) indexing, subject classification and retrieval of scientific and technical information; (5) searching scientific and technical literature, preparing bibliographies, reports, etc.; (6) obtaining and providing scientific and technical information and tendering advice thereon; (7) dissemination of information and liaison and field work for that purpose; (8) research on problems in information work. (p. 225)

Mikhailov and others, 1966:

> Informatics is the branch of knowledge which studies the patterns of collecting, processing, storing and disseminating documentary scientific information and which determines the optimum organisation of informational work on the basis of modern technical means. (p. 329, quoted by Brittain, 1970, p. 8)

Ostrowska and Lech, 1965:

> "Documentalist" and "information worker". The expansion of documentation activities and the growing importance of communication of scientific information no longer permit the formulation of close differentiations. Both these concepts are therefore treated jointly. . . .(p. ix)

American Standards Association, 1966

> Documentation. The collecting, organizing, storing, citing, and disseminating of documents or the information recorded in documents. (p. 15)
> . . . .
> Information Retrieval. The methods and procedures for recovering specific information from stored data. (pp. 17-18)

Donohue and Karioth, 1966:

> Information science was fathered . . . by the concern for information transfer.
> . . . .
> The change in emphasis from science information to a science of information has left some observers wondering. . . . There are those . . . who believe that no true science will emerge, that the

> field will always remain a collection of disparate disciplines coming together to solve practical problems. (p. 117)
> . . . .
> The information scientists have amassed a considerable body of knowledge about the properties, behavior, and flow of information. (p. 119)

Dorfman, 1966:

> It would be more reasonable to use informatics [than scientific information] as the name of a science which deals with the basic ideas, methods, and means of collecting, processing, storing, retrieving and disseminating any one type of information. (p. 72 in Mikhailov, Chernyi, and Gilyarevskii, 1967)

Bureau of Information Sciences Research, Rutgers University, 1967:

> [Information sciences, services, and systems] is concerned with research and development relating to communication with unknown persons in the indefinite future, i.e., with documentation. Delayed communication is therefore the principal subject. (p. x)

Foster, 1967:

> The name of the discipline [of information science] has itself been subject to varying definitions, and it would be very helpful if the conference [of the International Federation for Documentation, on education for scientific information work] could agree on terminology. In the United Kingdom, the term 'information science' was coined in the middle fifties, and has been used to describe various aspects of the work of obtaining, organizing and disseminating information (mainly scientific and technical information), including computer systems and the field has been differentiated from librarianship. In Europe, the title 'documentation' is more common, but this has not found favour in Britain as it implies a limitation to a document and a considerable amount of information does not involve documents.
>
> In the United States, information science tends to be applied only to research on computer systems, and there is no uniform name for other types of information work, nor is there always a break from librarianship. (pp. 220-221)

Mikhailov, Chernyi, and Gilyarevskii, 1967:

> Informatics is the discipline of science which investigates the structure and properties (not specific content) of scientific information, as well as the regularities of scientific information activity, its theory, history, methodology and organization. The purpose of informatics consists in developing optimal methods and means of presentation (recording), collection, analytical-synthetic

> processing, storage, retrieval and dissemination of scientific information. Informatics deals with logical (semantic) information, but is not involved in qualitative estimation of this information. (p. 73)

Dembowska, 1968:

> [The] terms "documentation and scientific information", "documentation", and "scientific information" will be used interchangeably in defining the entire field with which we are concerned. (p. 22)
> . . . .
> [The] subject of our deliberations will be documentation and scientific information understood as an organized activity, whose goal is to make accessible the achievements of science and practice, in order that they may be utilized for further promotion of science or for ameliorating practical activity in all fields. (p. 23)
> . . . .
> Documentation is the transfer of information through the medium of documents; . . . (p. 111)
> . . . .
> The task of the theory of scientific information is to investigate the process of the flow of information, to discover the failures appearing at individual stages of this process and to indicate the means for eliminating such failures.
> . . . .
> The process of the transfer of information . . . can be investigated from both directions . . . starting from the item of information, and the opposite way--starting from the user. (p. 113)

Fuellhart and Weeks, 1968:

> [Information science] is defined as the study and development of conceptual, methodological, and technological foundations for the control and distribution of substantive information. These foundations apply equally to the collection, storage, manipulation and retrieval of information and to the characteristics of information itself. (p. 3)

Mikhailov, Chernyi, and Gilyarevskyi, 1968:

> Informatics is the learned (nauchnyi) discipline which studies the structure and properties (but not the actual contents) of scholarly (nauchnyi) information, and the laws governing scholarly-information activity, its theory, history, methodology and organisation. The goal of informatics is the discovery of the optimum methods and means of representation, collection, analytico-synthetic processing, storage, retrieval and dissemination of scholarly information. Informatics has to do with meaningful (semantic) information, but not with the qualitative appraisal of that information. Such appraisal can be carried out only by specialistics in the particular scientific discipline or practical activity. (pp. 57-58, translated by Belkin, 1974, p. 88)

Saracevic and Rees, 1968:

> General agreement exists that information science is concerned with communication phenomena--i.e., behavior, properties, and transfer of information; processes involved in communication; and tools involved in implementing and facilitating the communication process. As in most scientific fields, we can discern basic and applied aspects. . . . Applied information science is oriented toward research leading to the eventual development of information systems, components and sub-components, tools and techniques, and their successful utilization. Such investigation includes natural and artificial systems as well as study of devices and techniques.
> . . . .
> In information science there has been a lack of differentiation between basic and applied research on the one hand and practice on the other. (p. 4097)

Hillman, 1969:

> Although information science is an emerging discipline whose structure is by no means apparent at this time, the activity that the science attempts to formalize is an old one. I find it agreeable that information science has many precursors, both in men and ideas.
>
> Historically speaking, the first noticeable activity in information science centered upon the famous Museum of Alexandria in the third century B.C. . . . [and its] library. (p. 335)
> . . . .
> [In information science] we are concerned with a total framework of knowledge or information transfer, behavior, and the like. (p. 336)

Menou, 1969:

> Documentation: stage of the information transfer included between appearance of primary information and output of the memory where secondary information was stored. Mainly production and processing of secondary information; . . .
> . . . .
> Informatics: is the discipline of science which investigates the structure and properties (not specific content) of transfer of knowledge as well as its regularities, theory, history, methodology and organization. The purpose of informatics consists in developing optimal methods and means of presentation (recording), collection, analytical-synthetic processing, storage, memorizing, retrieval and dissemination of information items. Informatics deals with logical (semantic) information, but is not involved in qualitative estimation of this information. (p. 62)
> . . . .
> Transfer of knowledge: operations performed to collect, describe, process through analysis and synthesis, store, memorize, retrieve and disseminate information items under their various forms (primary, secondary or tertiary) by means of any available technique.

. . . .
Information field: the information field is set up by all facts, organizations or men (i.e. primary information) which be of interest for a given discipline or branch of activity. (p. 61)
. . . .
Information item: any information, man or fact is or produces information item(s) which is raw material or data, pertaining to a given point of view. (p. 60)

Mikhailov, 1969:

> [Informatics is the] discipline that studies general laws and regularities governing the collection, storage, retrieval, and dissemination of scientific information, . . . (p. 3)

Weik, 1969:

> Documentation--The process of collecting, organizing, storing, citing, indexing, retrieving, and disseminating documents or their contents. Documentation involves a group of techniques necessary for orderly presentation, organization, and communication of recorded specialized information in order to give maximum accessibility and utility to the information contained in documents. (p. 115)
> . . . .
> Retrieval, data--The searching, selecting, and retrieving of actual data contained in a file; . . .
> Retrieval, document--The indexing, searching, and identification of specific documents that contain desired data concerning a matter of interest. (p. 249)
> . . . .
> Retrieval, information--The recovery and interpretation of stored data, including the procedures, techniques, and related activities involved, such as the selection and utilization of storage devices, the preparation of store and search routines, data mechanization, the indexing of stored data, and the coding of data. It is necessary to distinguish between document retrieval and actual data retrieval. (p. 250)

American Society for Information Science, 1970:

> Information Science as a discipline seeks to create and structure a body of scientific, technological, and systems knowledge related to the information transfer chain. (p. 101)

Chapman and St. Pierre, 1970:

> Documentation, the group of techniques necessary for the orderly presentation, organization and communication of recorded specialized knowledge, in order to maintain a complete record of reasons for changes in variables. Documentation is necessary

> not so much to give maximum utility as to give an unquestionable historical reference record. (p. 8-21)
> . . . .
> Retrieval, information, the recovering of desired information or data from a collection of documents or other graphic records. (p. 8-48)
> . . . .
> System, information retrieval, a system for locating and selecting, on demand, certain documents, or other graphic records relevant to a given information requirement from a file of such material. (p. 8-56)

Farradane, 1970:

> Information work [as a separate discipline] can be said to have developed first about 1920, after World War I, when the checks on publication were removed and the stimulus of the war effort to scientific and technical research was revealed in a flood of new literature. It was clear that the librarians of that time were not equipped to deal with either the scientific and technical content or the amount of detailed information essentially needed from such literature. It was clear, even then, that a new approach to the problem of information was needed. (p. 143)
> . . . .
> [In 1957] Mr. Hanson suggested the new distinctive title of 'information scientist' (in place of such varied names as information officer, intelligence officer, documentalist, etc.), . . . (p. 145)
> . . . .
> [The course offered, in 1961, was] 'Collecting and Communicating Scientific Knowledge'. . . . It was the first full course in the world for education in information science. (p. 148)

International Federation for Documentation, 1970:

> [Documentation] includes, inter alia, the organization, storage, retrieval, dissemination and evaluation of information however recorded, in the fields of science, technology, social sciences, arts and humanities. (quoted by Arntz, 1974, p. 390)

Auerbach, 1972:

> Let me talk about <u>information technology</u>. Information technology can be portrayed as the intersection of the technical fields of computer technology, communication, and what for want of a better word I will call information. . . . When I talk about communication, I talk about such things as telex, radio, TV, cable, and satellites--nor do I believe that communication is a subset of computer technology, or information science, or anything else. . . . When communication overlaps the computer technology field, we can talk about time-sharing systems or communicating with computers by means of remote terminals--intelligent terminals perhaps--building a middle ground between the two. (p. 217)

Farradane, 1972:

> [Information work is] the collection, collation, evaluation, and organized dissemination of scientific and technical information. If by "technical" there is to be understood any field having established techniques, then the definition will still be adequate. (p. 674)

Sippl and Sippl, 1972:

> Documentation--1. The process of collecting, organizing, storing, citing and dispensing of documents or the information recorded in the documents. 2. The group of techniques necessary for the orderly presentation, organization, and communication of recorded specialized knowledge in order to maintain a complete record of reasons for changes in variables. (p. 152)

Stone, 1972:

> [Information science] is the study of "event records" to determine their intrinsic nature, interrelationships, relation to the outcomes of recording events, and related dissemination activities.
> . . . .
> To me, information is an event noted and/or recorded. (p. 285)

Artandi, 1973:

> In a very general sense what we are concerned with in information transfer is the accurate transmission of signals and the "proper" interpretation of the received signals . . . of signals as individual meaningful messages.
> It is quite clear that it is in this . . . area in which answers to the problems of design, effectiveness and control of information systems must be found.
> . . . .
> Information is bought, sold, stored, traded, exchanged and consumed in economic terms. It is treated both as a product and a service, as a commodity to be used in the process of attaining human goals, and it is taking on the fundamental value aspects of money.
> We believe that information is essential to dealing with the complexities of our sophisticated industrial environment, that it can favorably affect human behavior and decision making, and that it can be scientifically studied, analyzed and controlled for its improved utilization. (p. 242)

Belkin, 1974:

> Informatics is the learned (nauchnyi) discipline which studies the structure and properties (but no the actual contents) of scholarly (nauchnyi) information, and the laws governing scholarly-information

> activity, its theory, history, methodology and organisation. The goal of informatics is the discovery of the optimum methods and means of representation, collection, analytico-synthetic processing, storage retrieval and dissemination of scholarly information. Informatics has to do with meaningful (semantic) information, but not with the qualitative appraisal of that information. Such appraisal can be carried out only by specialists in the particular scientific discipline or practical activity. (quoted by Brimelow, 1974, p. 167)

Debons and Montgomery, 1974:

> Document transfer systems are essentially environments that deal with the physical product of the information generation process. The document is a commodity where the acquisition, processing (cataloging, indexing), and dissemination functions depend on logistical as well as marketing principles. (p. 27)

Dembowska, 1974:

> [The] scope of investigations performed by informatics . . . is concerned rather with problems pertaining to methods, forms and means of transmitting and disseminating primary scientific information (first of all through the intermediary of documents of various types) . . . . [The] problems of generation, collection and dissemination of secondary scientific information (bibliographies, abstracts, indexes, etc.) constitute the proper domain of informatics, . . . (p. 188)
> . . . .
> [The] basic subject of informatics is investigation of facts, phenomena and processes connected with transmission and dissemination of primary scientific information and with its processing and making accessible in the form of secondary information. (p. 191)

United Nations Educational, Scientific, and Cultural Organization, 1976:

> [Informatics is] the totality of disciplines and technologies for the systematic treatment (particularly by computer) of data and information seen as the medium for knowledge with a view to its conservation in time and its communication in space. (quoted from Terminology of Documentation (Paris: Unesco, 1976) by Unesco, 1980, p. 11)

Harrod, 1977:

> Documentation. See Harrod, 1971.
> Information Work. See Harrod, 1971.
> Document. See Harrod, 1971.
> Information. See Harrod, 1971.
> . . . .
> Informatics. 1. The processes, methods and laws relating to the recording, analytical-synthetical processing, storage, retrieval and dissemination of scholarly information, but not the scholarly

information as such which is the attribute of the respective science or discipline. 2. The study of the structure of knowledge and of its embodiment in information-handling systems. (pp. 417-418)
. . . .
Information Science. The study of the properties and behaviour of information, the forces governing the flow of information, and the means of processing it for optimum accessibility and usability. -H. Borko. (p. 420)

Neveling and Wersig, 1977:

[Information work] means actually carrying out activities which allow information transfer and require knowledge of the handling of information (excluding all professions which are subsidiary, like pure electronic data processing, pure reprography, etc.). (p. 214)

Hlavata, 1978:

There has not yet been found a relevant and exhaustive definition of informatics as a special discipline; nor is there an established name for it, widespread versions being scientific and technical information, information and documentation, etc. We have introduced a working definition of the entire subject area so that its terminology could be studied. We empirically refer to it all that is connected with the collection, processing, storage and dissemination (utilization) of information including theoretical papers in this field. (p. 140)

MacGregor, 1978:

[I] have taken documentation to embrace libraries and information centres, services and systems, ...
. . . .
[Research] in our field concerns itself with the transfer of information. . . . (p. 342)

5.4. Definitions about Objects: To process

International Federation for Documentation, 1960:

Documentation is a term which means very different things to different people and in different regions. Little use would be served by restarting the debate on its definition. Taking as a base the description carried in the statutes of the Federation "Documentation is the collection and storage, classification and selection, dissemination and utilisation of all types of information". . . .

> Documentation in a more restricted sense may be defined as the art and science of handling and organizing information in all science and techniques, including economics and social sciences. (p. 9)

Welt, 1964:

> [Information science] deals with the problems of communication by means of the written word. . . . It is not terribly concerned with the subject-matter to be communicated. Instead, it creates theoretical schemes for the handling of all information, . . . It exalts "know-how" over "know-why." It is mostly computer-oriented.
>
> Science information, on the contrary, is the handmaiden of the physical and natural sciences. (p. 249)

Hayes, 1965:

> [Information science] is the formalization of the processes for handling information, particularly in the context of modern library techniques and information retrieval. (p. 62)

Salton, 1965:

> This area of information science deals in its broadest sense with the manipulation and processing of information, and, in a more restricted context, with automatic documentation, information storage, and retrieval. (p. 121)

Wooster, 1965:

> Electronic information handling . . . is a rapidly developing technology. It is parasitic upon, symbiotic with, and host to all other technologies. Like all other technologies, it is dependent upon a body of fundamental scientific disciplines and knowledge. Advances in information technology can only come in three ways: by specific research and development efforts aimed at information handling per se; by exploiting the fortuitous advances in ancillary technologies; and, by improvements in fundamental scientific knowledge and understanding. (p. 279)

Arnold, Hill, and Nichols, 1966:

> Information retrieval. The methods and procedures for recovering specific information from stored data. (p. 313)
>
> . . . .
>
> Data processing. Any operation or combination of operations on data to achieve a desired result. (p. 311)
>
> . . . .
>
> In its broadest sense, data processing refers to the recording and handling that are necessary to convert data into a more refined or useful form. In the past these tasks were referred to as record keeping or paperwork. (p. 1)

International Federation for Information Processing, 1966:

> Data processing: The execution of a systematic sequence of operations performed upon data, e.g., handling, merging, sorting, computing.
> Note: Where data processing is performed in order to increase the value or significance (from a certain point of view) of the information conveyed by the data, it may be called Information Processing. (pp. 4-5)
> . . . .
> Data: A representation of facts or ideas in a formalised manner capable of being communicated or manipulated by some process.
> Note: The representation may be more suitable either for human interpretation (e.g. printed text) or for interpretation by equipment (e.g. punched cards or electrical signals).
> . . . .
> Information: In automatic data processing the meaning that a human assigns to data by means of the known conventions used in its representation.
> Note: The term has a sense wider than that of ordinary information theory and nearer to that of common usage. (p. 3)

Sippl, 1966:

> Information processing--The processing of data representing information and the determination of the meaning of the processed data. (p. 88)
> . . . .
> Data processing--1. Any procedure for receiving information and producing a specific result. 2. Rearrangement and refinement of raw data into a form suitable for further use. 3. The preparation of source media which contain data or basic elements of information, and the handling of such data according to precise rules of procedure to accomplish such operations as classifying, sorting, calculating, summarizing, and recording. 4. The production of records and reports. (Synonymous with data handling.)
> . . . .
> Data handling--The production of records and reports. (p. 56)

Borko, 1967:

> Information science studies the properties and behavior of information, the forces governing the flow of information, and the means of processing it for optimum accessibility and usability. It is an interdisciplinary science using the skills and knowledge of logicians, mathematicians, linguists, librarians, computer programmers, engineers, and behavioral scientists. (p. 121)

Licklider, 1967:

> Our field--the field of computer and information sciences and technology--is an extremely reflesive, regenerative field. It is concerned in large part with development and understanding of tools and techniques for dealing with information. Thus it is in a sense the science and technology of processes fundamentally involved in the advancement of science and technology. (p. 1)

Slamecka, 1967:

> Information science is the study of the nature and properties of information, and of information processing techniques and devices. It finds engineering applications in the design of information systems and their components serving a broad variety of purposes. (p. 3)

Taylor, 1967:

> [Information science] investigates the properties and behavior of information, the forces governing the transfer process, and the technology necessary to process information for optimum accessibility and use. Its interests include information representations in both natural and artificial systems, the use of codes for efficient message transmission, storage, and recall, and the study of information processing devices and techniques such as computers and their programming systems.
>
> It is an interdisciplinary field derived from and related to mathematics, logic, linguistics, psychology, computer technology, operations research, librarianship, the graphic arts, communications, management, and similar fields. It has both a pure science component, which inquires into the subject without regard to applications, and an applied science component, which develops services and products. (from a letter to the membership of the American Society for Information Science by its president, quoted by G. Jahoda, 1969, p. 331; also quoted by Atherton and Greer, 1968, fn. 1, p. 330)

Davis, 1968:

> It can be seen that there are definite similarities between information science . . . and the meaning of the somewhat older term 'documentation'. (p. 5)
>
> . . . .
>
> Information science, like documentation, is interdisciplinary, and it would seem to concern itself primarily with the procedures of methodology of information processing. (pp. 5-6)

Dembowska, 1968:

> And thus by the end of the last century, two main meanings, used to this day, of the word "documentation" were precisely defined: the handling of documents, and the subject, or the result, of this activity, a collection of documents.
>
> During the several scores of years since the appearance of the term "documentation", its range of meaning has been broadened and differentiated. Today, this term is most often used in the following meanings: 1) a collection of documents, 2) a list of documents, 3) a field of activity (documenation activity), 4) a domain of science or knowledge which sets theoretical bases of documentation activity, its methodology and technique. Documentation understood as a theoretical field is also called documentology. (p. 11)
>
> . . . .
>
> Documentation as a field of activity does not yet have a generally accepted fixed definition, though endeavors to create such definitions have for long been and are still being made. (p. 13)
>
> . . . .
>
> [Previous definitions are not] explicit in character; they do not clearly define the scope of documentation activity, or provide information as to the extent and differentiation of the problems of this domain which is still in a state of constant development. (p. 15)

Stevens, 1970:

> Any consideration of <u>generalized</u> research and development requirements in the computer and information sciences should obviously be based on one or more aspects of the fundamental information processing cycle--the acquisition of information; the processing of information to find, fix, and focus significant features present; the recording and storage of processed information for subsequent use, and the selective recall or retrieval of processed and stored information for use. (p. 3)

Farradane, 1971:

> In Great Britain the term 'information science' has been used to cover both the theoretical and practical aspects of information handling, from searching the literature, answering enquiries, abstracting and writing reports, to classification, indexing, computer-based information retrieval systems, and the testing of such systems. It has not, in Great Britain, been envisaged as <u>only</u> a discipline of investigative science . . . as it now appears to be widely accepted in the United States. Nor has it been quite the counterpart of 'information technology' (techniques of information handling).
>
> Discussions on 'information work' (the earlier term used for information science in the British meaning) began in Great Britain as early as 1923 and the subject soon diverged from librarianship, . . . (p. 400)

. . . .
Information is a highly elusive concept; it is certainly not to be equated with 'data'. We may perhaps define 'knowledge' as something in the mind (wisdom is too grandiose a term to use), and 'information' as some form of communicated knowledge. Much more work will have to be done on the psychology of thinking before we can have adequate theories of these parts of the consensus. (p. 407)

Gould, 1971:

Informatics: Those aspects of science and technology specifically applicable to data processing, and particularly to automatic data processing. (p. 4)
. . . .
Data processing: The execution of a number of operations (partially ordered in time) upon data, for example, handling, merging, sorting, computing.
Automatic data processing: Data processing largely performed by automatic means; by extension, also the discipline which deals with methods, techniques, etc., related to such data processing. (p. 3)
. . . .
Data: A representation of facts or ideas in a formalised manner capable of being communicated or manipulated by some process.
Note: The representation may be more suitable either for human interpretation (for example printed text), or for interpretation by equipment (for example punched cards or electrical signals).
. . . .
Information: In automatic data processing the meaning that a human expresses by or extracts from data by means of the known conventions of representation used.
Note: The term has a sense wider than that of information theory, and nearer to that of common usage. (p. 1)

Wysocki, 1971:

Generally speaking, "documentalists" can be divided in two broad categories: information specialists (information officers, or science information specialists) and information scientists.

The information specialist is a service-oriented person, as against a research and development person. Existing practice shows that the information specialist can have a position at any of the different stages of information processing, such as: collecting, indexing, retrieval, etc.
. . . .
[The work of the information scientist] relates rather to the design of information systems and its development, than to the more specific tasks of scientific information processing. (p. 31)

Institute of Information Scientists, 1973:

> Information Processing, processing of data, using computer techniques, to produce alphanumeric information in a required form by sorting, abstracting, rearranging and computing the data which are input to the system. (p. 104)

Gupta, Shirey, and Debons, 1974:

> The science of information encompasses the theories and principles which concern the transformation of data into information. Included are the gathering, transmitting, processing, depicting, utilizing and transfer functions. Data remain data until acted upon by an organic information processor. . . . Information processing and utilization is a central phenomenon in the very existence of man, and its sociological and psychological effects can not be ignored. There is a need to perceive the information phenomenon as part of a large value system designed to optimize human development, and it is this approach that makes Information Science truly interdisciplinary. (p. 34)

Horsnell, 1974:

> Documentation, is seen as: "Handling of recorded information". Information . . . is seen as: "All kinds of transferable forms of knowledge". (p. 5ɔ)

American National Standards Committee, 1977:

> Information retrieval: (1) (ISO)*The action of recovering specific information from stored data. (2) (ISO) Methods and procedures for recovering specific information from stored data.
> . . . .
> Information processing: (ISO) Synonym for data processing. (p. 76)
> . . . .
> Data processing: (ISO) The execution of a systematic sequence of operations performed upon data, e.g., handling, merging, storing, computing. Synonymous with information processing. (p. 42)
> * ISO is the International Organization for Standardization

International Business Machines, 1981:

> . . . .
> Data processing (DP). (1) (TC97) The systematic performance of operations upon data, for example, handling, merging, sorting, computing. Synonymous with information processing. (p. 110)

5.5. Definitions about Objects: To create and transfer

Stevenson, 1958:

> Documentation is really the business of handling specialized information. It includes not only the organization and retrieval of such information, but its creation and distribution. The basic unit handled--at least in the technical field--is the unpublished research report. (p. 128)

Orne, 1967:

> Let us say that information science is any method, pattern, or system designed to produce useful data when and where it is needed, in appropriate volume. The technology of information science may be the sum of or any one of the component elements needed for such methods, patterns, or systems. (p. 703)

Taylor, 1972:

> Information science is concerned with . . . the phenomena of message generation, storage, organization, structure, filters, and transfer. . . . Its objective is to explicate, to state, and to test hypotheses relevant to information systems and communication environments. (p. 152)
>
> Information engineering is directed toward the design and testing of devices and systems useful for the solution of actual problems in operating environments. Its principal concerns are the design of experiments and the evaluation of results in operating systems. (pp. 152-153)
>
> Information services . . . is directed toward . . . service functions in information centers and other knowledge dissemination systems. (p. 153)

Zunde and Gehl, 1979:

> Here we adopt the view that information science is the study of the nature of information as it manifests itself in various phenomena related to information generation, transmission, transformation, accumulation, storage, and other such processes. We do not limit the subject matter to a particular type of information, . . .
> . . . .
> Information science as an empirical discipline is not concerned with what information is in an ontological or metaphysical sense. . . . Problems of this kind lie in the domain of philosophy, not science. (p. 68)

5.6. Definitions about Objects: To create and use

Davis, 1935:

> "Documentation" is used because it includes all phases of issuance, use and interchange of recorded information. (p. 153 in Schultz and Garwig, 1969)

Tate, 1950:

> As defined by the International Federation for Documentation (of which the American Documentation Institute is the American affiliate), the term "documentation" refers to the creation, transmission, collection, classification and use of "documents"; documents may be broadly defined as recorded knowledge in any format. (p. 3)

Special Libraries Association, Executive Board, 1951:

> Documentation is the art comprised of (a) document production, (b) document distribution and (c) document utilization. (quoted by Jackson, 1954, p. 151)

Jackson, 1954:

> There are as many definitions of "documentation" as there are workers in the field. Even the limits of the field itself cannot be described due to the lack of a generally accepted definition. The definition that I prefer is the official SLA definition adopted by the Executive Board in February 1951. "Documentation is the art comprised of (a) document production, (b) document distribution and (c) document utilization." In this definition, a document is taken to be any piece of recorded information, whatever its form or use. In this way, reports, films, photographs, maps, punched cards, magnetized tape, oscillograph traces--all become documents.
> . . . .
> Among the most interesting phases of documentation is that relating to the emergence and dominance of the research report. This report is also called the unpublished report, the scientific report, the technical report, or the contract report. It is essentially a postwar phenomenon. . . . (p. 151)

Conference on Training Science Information Specialists, 1962:

> *Information science.* The science that investigates the properties and behavior of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. The processes include the origination, dissemination, collection, organization,

> storage, retrieval, interpretation, and use of information. The field is derived from or related to mathematics, logic, linguistics, psychology, computer technology, operations research, the graphic arts, communications, library science, management, and some other fields. (p. 115)
>
> . . . .
>
> *Information scientist.* One who studies and develops the science of information storage and retrieval, who devises new approaches to the information problem, who is interested in information in and of itself. (p. 114)
>
> . . . .
>
> *Documentation and documentalist.* We have avoided use of these two terms because of the wide variation in their use and in the numerous interpretations of their meaning. We suggest, therefore, if anyone should wish to use these terms he should state his particular definition. (p. 116)

Taylor, 1963:

> [It] is assumed that the term [information science] connotes to each reader all the major functions, from generation to utilization of information, within the communication cycle. (p. 271)

Cuadra, 1966:

> [Information science and technology] draws on fragments and fringes of a number of sciences, technologies, disciplines, arts, and practices. The element that provides whatever degree of cohesiveness now exists in the field is a shared deep concern with "information"--its generation, transformation, communication, storage, retrieval, and use. (p. 1)

Stolk, 1966:

> Documentation - the process of collecting, organizing, storing, citing and dispensing of documents or the information recorded in documents. (p. 13)
>
> . . . .
>
> Information Science - the study of the generating, acquiring, processing, storing, retrieving, disseminating and using information; the study of the properties, structure and transmission of information; and the development of methods for the useful organization of data and dissemination of information. (p. 20)
>
> . . . .
>
> Information Processing - the processing of data representing information. (p. 19)

Borko, 1968:

> [Information science] is an interdisciplinary science that investigates the properties and behavior of information, the forces that govern the flow and use of information, and the techniques, both manual and mechanical, of processing information for optimal storage, retrieval, and dissemination.
> [Documentation] is one of many applied components of information science . . . concerned with acquiring, storing, retrieving, and disseminating recorded documentary information, primarily in the form of report and journal literature. . . . [It] has tended to emphasize the use of data processing equipment, reprography and microforms as techniques of information handling. (p. 5)
> . . . .
> [Information science] is concerned with that body of knowledge relating to the origination, collection, organization, storage, retrieval, interpretation, transmission, transformation, and utilization of information. This includes the investigation of information representations in both natural and artificial systems, the use of codes for efficient message transmission, and the study of information processing devices and techniques such as computers and their programming systems. It is an interdisciplinary science derived from and related to such fields as mathematics, logic, linguistics, psychology, computer technology, operations research, the graphic arts, communications, library science, management, and other similar fields. It has both a pure science component . . . and an applied science component, . . . (p. 3)

Schlueter, 1968:

> Information science--That discipline which investigates the properties and behavior of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. It includes the origination, dissemination, collection, organization, storage, retrieval, interpretation, and use of information.
> Information scientist--One who studies and develops the science of information, who devises new approaches to the information problems, and who is interested in information in and for itself. (p. 152)

Taylor and Borko, 1968:

> [The total information transfer chain is a process] viewed as a cycle ranging from the generation of information to its eventual use in generating new information. It includes the problems of editing, publishing, organizing, retrieving, disseminating, and using information. (p. 304)

Belzer, 1969:

> The profession of information science deals with many aspects of information, its properties, origination, manipulation, structure, control, and use. The profession is concerned with information systems, their design, operation, evaluation, and components. It cuts across such disciplines as logic, behavioral sciences, cybernetics, communication theory, languages (both natural and synthetic), machine translation, and pure and applied mathematics. It interacts strongly with the development in the new technologies of computers, automation, microimaging, storage and retrieval, and communication, transmission, and display of information.
> . . . .
> Theory concerning information should be the basis for explaining the environment of information systems and the analysis of problems relating to that environment. It should deal with the methodology for developing models and simulation techniques for testing and evaluating alternative approaches to systems design. . . . .
> Information systems deals with the design and testing of systems for a specific purpose or use in handling information. Collection, reduction, organization, storage, transmission, and dissemination are components which must be integrated into a system. (p. 329)

Kitagawa, 1969:

> While, on the one hand, we can expect to have many new possibilities opened up by information science and technology in the cybernetics era, on the other, there will be new social needs created by the introduction of multifarious information systems combined with control and/or communications systems. It is not unrealistic to imagine that such current functions as administration, regulation, and planning--all of which are performed by parliaments, central and/or local government agencies, and the like--will be replaced by appropriate sets of information systems. . . . [The] sole function of urban areas will be to act as centers of social information.
> . . . .
> Now when we consider a cybernetics era where information is one of the predominant factors in production and in society, the question of whether nations and countries need to exist and whether they are worth maintaining might well become an important subject to be thoroughly investigated by scientists. In particular, there remain unsolved such important research problems as how informaiton scientists will initiate an evaluation system for information and how the rights of information ownership will be determined. These two problems may prove to be the subject of the deepest debate in attempting to organize international cooperation among scientists and technologists and in establishing any scientific information system. (p. 235)
> . . . .

> Broadly speaking, there should be some sort of criterion for nontriviality of information as an approximate notion to be used in identifying essential new information [for storage]. (p. 237)
> . . . .
> By information institutions we mean such existing bodies as research institutes, academic societies, libraries, universities, schools, production plants, etc. We refer to them as information institutions simply because each is concerned with at least one of the following aspects of information function:
> Production of original source information. . . .
> Formation of essentially new information within the framework of a specified store of information. . . .
> Publication of essentially new information in the form of documents. . . .
> Storage of information
> Information organization processes which may lead to recognition formulation of deductive theory and/or a systematic framework of subject description. . . .
> Transmission of recognition
> Utilization of recognition and information for rational purposes. . . . (p. 239)

Case, 1970:

> Information Science. The study of generating, acquiring, processing, storing, retrieving, disseminating, and using information; the study of the properties, structure, and transmission of information; and the development of methods for the useful organization of data and dissemination of information. [from Glossary of Fifty Definitions - Scientific and Technical Information, Committee on Scientific Information, Washington, 1964]
> That science that studies creation, management, and exploitation of recordable knowledge. The theoretical basis for the field of documentation. (p. 217)
> . . . .
> Information Retrieval. The methods and procedures for recovering specific information from stored data. [from Glossary for Information Processing, IBM, White Plains, 1964]
> The recovery of data from a collection for the purpose of obtaining information. Retrieval includes all the procedures used to identify, search, find and remove specific information or data stored. It excludes both the creation and the use of the data. [from Glossary, above]
> The recovering of desired information or data from a collection of documents or other graphic records.
> . . . .
> Information Retrieval System. A system for locating and selecting, on demand, certain documents, or other graphic records, relevant to a given information requirement from a file of such material. [from Glossary of STINFO Terminology, by Dana L. Thompson, Washington, 1963] (p. 216)

Sharr, 1970:

> [The] term "information science" is applied to the various disciplines concerned with the production, organization, dissemination and assimilation of information. (p. 4)

Wilkie, 1971:

> Information science is a discipline derived from many other disciplines, arts, and professions. It has been defined generally to include the generation, collection, organization, interpretation, storage, retrieval, dissemination, transformation, and use of information. (p. v)

Pirog, 1972:

> Information science theory as well as information science itself has not yet found its final form and definition. More generally speaking, we can define information science as the science which examines the regularities and relationships which occur in the information process and determines the optimal conditions for informational activity. We can say, with professor A. Mikhailov that information science is a science examining: 1) information activity as the whole of the process of elaboration of scientific documents, their collecting, analytical and synthetic processings, their conservation, and retrieval and dissemination of the information they contain; 2) documents as material support for information; 3) the means which insure the realization of informational processes.
>
> In this field of science, the research processes do consist of a creative phase--the birth of information itself--and of that its transfer and reception, or dissemination, its collection, conservation, retrieval, availability and utilization. (p. 13)

British Standards Institution, 1976:

> Documentation. (a) A concept which includes the collection, organization, recording and generation of documents for the purposes of the storage, retrieval, utilization or transmission of information contained in them.
>
> (b) In a narrower sense, a list or a collection of documents (or the information) on a given subject.
>
> . . . .
>
> Documentalist. One who carries out the work of documentation as exemplified in the work of an archivist, bibliographer, librarian or information scientist. (p. 23)
>
> . . . .
>
> Information science. (a) The collection, collation, evaluation, organized storage and dissemination of information, and theoretical and practical studies of such procedures.
>
> (b) The science of the properties and behaviour of information and of its handling, especially by a

computer, for use by people needing the information.
Information scientist. One occuped in the collection, collation and evaluation, and organized storage and dissemination of information. (p. 34)

. . . .

Informatics. The study of the structure and properties, but not the specific content, of scientific information as well as the regularities of scientific information activity, its theory, history, methods and organization. The term first gained currency in Eastern Europe and has recently been adopted by the International Federation for Documentation (FID). (p. 34)

Wersig, 1976:

Information science. (1) The science concerned with creation, management and exploitation of recordable knowledge. (2) The study of the properties, structure and transmission of information, and the development of methods for the useful organization of data and dissemination of information.

. . . .

Information sciences. All sciences concerned with the study of information processes and systems.

. . . .

Informatics. The science concerned with the study of problems connected with processes of specialized information and documentation. (p. 54)

. . . .

Documentation. The continuous and systematic processing of documents or data, including e.g. location, identification, 'acquisition', analysis, storage, retrieval, circulation and preservation for the specialized information of users. (p. 98)

. . . .

Communication sciences. All sciences concerned with the study of communication processes and systems. (p. 53)

. . . .

Information process. (1) The process of communicating 'information'. (2) The process of effecting 'information'. (p. 74)

. . . .

Information retrieval. The action of or methods and procedures for recovering specific information from a collection of stored data. (p. 140)

. . . .

Retrieval. The action of recovering something. (p. 141)

. . . .

Retrieval system. A 'system' whose purpose is retrieval. (p. 152)

. . . .

Storage and retrieval system. That subsystem of a 'documentation system' which permits storage and retrieval. (p. 152)

5.7. Definitions about Objects: To use

American Library Association, 1943:

> Documentation. The establishment, identification, collection, and use of documents. (p. 48)

Ditmas, 1949:

> If we define it [documentation] as the aspect of bibliography in which the stress is laid most heavily on the development of aids to the active utilization of recorded knowledge, as opposed to custodianship, we realize that it has always been implicit in any scheme for the efficient arrangement of the materials of research. (p. 332)

Special Libraries Association, 1950:

> Documentation
> "The identification, the investigation, the assemblying and the use of documents." [Source: French Union of Documentation Services.] (p. 7)

American Documentation Institute, Documentation Committee, 1951:

> [Documentation is] the art comprised of (a) document reproduction, (b) document distribution, and (c) document utilization. (p. 305)

International Federation for Documentation, 1953:

> [Documentation:] collection, storage, classification, selection, dissemination and utilization of all information. (quoted by Dembowska, 1968, p. 13)

American Documentation Institute, Ad Hoc Committee, 1955:

> "The art of facilitating the use of recorded, specialized knowledge through its presentation, reproduction, publication, dissemination, collection, storage, subject analysis, organization, and retrieval." Mrs. Helen L. Brownson, National Science Foundation. (p. 254)

Hyslop, 1956:

> Recognition of the importance of storing and retrieving information dates back to ancient times.
> . . . .
> It is no exaggeration to say that development of methods for analysis, storage, selection and retrieval of knowledge dates back to the beginnings of science as we know it. (p. 101)
> . . . .

> [The] use to be made of recorded knowledge is the basic factor that requires first consideration [in system and device application].
>
> In the extreme case, the knowledge recorded in a given collection of documents may be predicted to be of no further use. . . . (p. 103)

Bjorkbom, 1959:

> [In the 1940s] the word documentation had acquired a new meaning. It no longer dealt with the general bibliographical control but with the means of utilization of scientific literature within a special field. It is an intensive, not as before, an extensive activity. (p. 68)

Booth and Wadsworth, 1960:

> A documentation system is a complex pattern of interacting and interdependent processes which facilitates the use of recorded specialized knowledge through its presentation, reproduction, publication, dissemination, acquisition, characterization, storage, and retrieval. (p. 5)
>
> . . . .
>
> In theory, no single documentation process should be overlooked by the documentalist engaged in designing or operating a documentation system. Ideally, the documentalist should endeavor to establish some control over all of the processes of documentation if he is to deal with a coherent whole, i.e. a system. However, in actual practice, in the majority of documentation situations, we believe the processes of documentation may be divided into two categories. On the one hand there are those processes over which the documentalist actually exercises little or no control. These include the four processes of presentation, reproduction, publication, and dissemination. On the other hand, there are those processes over which the documentalist can and actually does exercise a high degree of control. These processes are acquisition, characterization, storage, and retrieval. (pp. 5-6)

International Federation for Documentation, 1960:

> Documentation is a term which means very different things to different people and in different regions. Little use would be served by restarting the debate on its definition. Taking as a base the description carried in the statutes of the Federation "Documentation is the collection and storage, classification and selection, dissemination and utilisation of all types of information", . . .
>
> Documentation in a more restricted sense may be defined as the art and science of handling and organizing information in all science and techniques, including economics and social sciences. (p. 9)

Clapp, 1961:

> [In] 1956, "information storage and retrieval" was still a phrase of art in the vocabulary of documentalists. Today it is a byword. . . .
>
> The phrase doubtless performs a useful role in calling attention to an important group of problems--those which surround the exploitation of recorded information, whether in or outside of libraries. (p. 224)

Mohajir, 1965:

> The word "documentation" can be defined as the systematic organization of documents including their collection and dissemination. (p. 17)

Brookes, 1974a:

> [Man] selects some [sensory inputs] for special attention, interprets, organizes, and imposes patterns on them. He sometimes actively seeks information to solve his problems. He thus acquires knowledge--subjective knowledge. But he also creates knowledge--objective knowledge--by expressing himself in publicly observable ways which may attract the cognitive attention of other humans. (p. 147)
>
> The mysteries of this process have been studied by philosophers for more than 2,000 years. The mind of man is not directly observable. So when we attempt to interpret what I call the fundamental equation which relates information to knowledge:
>
> $$\Delta I + (S) \rightarrow (S + \Delta S)$$
>
> where ΔI is the information input which modifies the 'knowledge structure' from (S) to $(S + \Delta S)$, we find difficulty in giving any interpretation whatever to any of the symbols used in that equation. It is possible to observe the information inputs in terms of physical signals, but in the final stage of the process the physical signals are transduced into private interpretations or thoughts which are themselves functions of the individual (S). If we now write $\Delta I = \Delta f(I,S)$, the equation becomes
>
> $$\Delta f(I,S) + (S) \rightarrow (S + \Delta S)$$
>
> And this is an implicit equation for (S) of a hopelessly intractable kind. (pp. 147-148)
>
> . . . .
>
> After my brief review of the whole wide world of information I would redefine the scope of information science as the analysis, organization, dissemination, and application of objective knowledge. (p. 152)

Amarel, 1976:

> The problems of organizing and managing knowledge, and of designing systems for its storage and retrieval (in the form of documents or facts), are shared between computer science and library science. The activities at the interface between these two disciplines are often identified as part of information science. The main concern of information science is with processes of communication, storage, management, and utilization of information in large data base systems. Thus, the domain of information science is included in the broader domain of computer science. (p. 316)

5.8. Definitions about Objects: To evaluate

Wooster, 1963a:

> Information is encoded knowledge. Information Sciences is comprised, therefore, of the body of scientific knowledge, methodology and techniques necessary for the acquisition, transmission, transformation, evaluation, ordering, filtering and interpretation of information. . . . The predominant usefulness of future information processing systems will be in aiding the human in ordering and filtering and interpreting extremely complex situations and to propose to him, or even make for him, decisions that he could not arrive at rationally, in the face of the abundance of the inter-related factors that exceed his own capability of evaluation. (p. 151)

Aspnes, 1962:

> It is difficult to define "documentation" much less describe it, but for our general purpose we might use "The art, science and/or technique for collecting, evaluating, storing, indexing, retrieving and disseminating recorded information; and methods and devices for improving the efficiency of this work." (p. 161)

International Federation for Documentation, 1970:

> [Documentation] includes, inter alia, the organization, storage, retrieval, dissemination and evaluation of information however recorded, in the fields of science, technology, social sciences, arts and humanities. (quoted by Arntz, 1974, p. 390)

Amarel, 1976:

> The problems of organizing and managing knowledge, and of designing systems for its storage and retrieval (in the form of documents or facts), are shared between computer science and library science. The activities at the interface between these two disciplines are often identified as part of information science. The main concern of information science is with processes of communication, storage, management, and utilization of information in large data base systems. Thus, the domain of information science is included in the broader domain of computer science. (p. 316)

5.9. Definitions about Objects: To manage or control

Mohajir, 1965:

> The management of information itself is a science. The problems that confront information management are of manifold nature. The management of information in other words, means efficient use of information. (p. 18)

Slamecka, 1967:

> Information science is the study of the nature and properties of information, and of information processing techniques and devices. It finds engineering applications in the design of information systems and their components serving a broad variety of purposes. (p. 3)

Fuellhart and Weeks, 1968:

> [Information science] is defined as the study and development of conceptual, methodological, and technological foundations for the control and distribution of substantive information. These foundations apply equally to the collection, storage, manipulation and retrieval of information and to the characteristics of information itself. (p. 3)

Belzer, 1969:

> The profession of information science deals with many aspects of information, its properties, origination, manipulation, structure, control, and use. The profession is concerned with information systems, their design, operation, evaluation, and components. It cuts across such disciplines as logic, behavioral sciences, cybernetics, communication theory, languages (both natural and synthetic), machine translation, and pure and applied mathematics.

It interacts strongly with the development in the new technologies of computers, automation, microimaging, storage and retrieval, and communication, transmission, and display of information.

. . . .

Theory concerning information should be the basis for explaining the environment of information systems and the analysis of problems relating to that environment. It should deal with the methodology for developing models and simulation techniques for testing and evaluating alternative approaches to systems design. . . . .

Information systems deals with the design and testing of systems for a specific purpose or use in handling information. Collection, reduction, organization, storage, transmission, and dissemination are components which must be integrated into a system. (p. 329)

Debons and Otten, 1969:

Although the field of information as relegated to the term information science is relatively new, its foundations are well established fields and activities, both in scientific and technological areas. (p. 351)

. . . .

The one context in which converging interests can be seen as contributing to the formation of a field of information and ultimately to a science of information is in the development of military command and control systems and the related scientific and technological activities which accompanied the implementation of such systems.

. . . .

The . . . developments of information systems for military functions are given further meaning by the recent trend toward the extension of these military developments to the public and private sectors. Information systems are now gaining prominence to serve commerical and community needs. . . . The development of more and more sophistication in these [information and computer utility] systems will provide a scientist interested in the information phenomenon with an expanded information environment which he may consider to be his laboratory. (p. 347)

Hoyt, 1969:

The term information science has been given several interpretations, among them the following:

1. Information handling as a library function involving document manipulation,
2. An interdisciplinary field of instruction relying heavily on concepts from related fields,
3. Information engineering concerned with the design and operation of current and experimental information systems,
4. A discipline of a scientific nature having its basis in mathematics and logic.

> In this report we will refer to information science as either of the last two interpretations. (p. 358)
> . . . .
> It is also of interest that the ACM Curriculum Committee on Computer Science, in discussing the varied terms used to represent "computer science," has noted the use of the term "information science" and suggested using the phrase "computer and information science." (fn 1, p. 358)

International Business Machines, 1969:

> Information retrieval. (ISO). The methods and procedures for recovering specific information from stored data. (p. 28)
> . . . .
> Information processing. (ISO). (See "data processing".) (p. 28)
> . . . .
> Data processing. (ISO). The execution of a systematic sequence of operations performed upon data. (Synonymous with "information processing".)
> . . . .
> Data management. A general term that collectively describes those functions of the control program that provide access to data sets, enforce data storage conventions, and regulate the use of input/output devices. (p. 27)

Kunz and Rittel, 1971:

> The subject of information sciences is the design and installation of information systems of any kind--whether they require computers or not--scientific and technical systems (STI) which so far have been given the larger amount of attention are only one among the numerous types of information systems. (p. 213)

Vagianos, 1971:

> Information scientists, librarians, information technologists, etc., are concerned with the design, installation, and operation of information systems. Information science uses the developments of basic research to solve its existing problems (e.g. library automation, learning and information theory). (p. 33)

Wysocki, 1971:

> Generally speaking, "documentalists" can be divided in two broad categories: information specialists (information officers, or science information specialists) and information scientists.
> The information specialist is a service-oriented person, as against a research and development person. Existing practice shows that the information specialist can have a position at any of the different stages of information processing, such as: collecting, indexing, retrieval, etc.
> . . . .

> [The work of the information scientist] relates rather to the design of information systems and its development, than to the more specific tasks of scientific information processing. (p. 31)

Merta, 1972:

> [In] connection with the development of information science, and especially of the discipline of informatics as the theory of scientific information, two new professions have taken shape: that of information scientist studying information problems and information phenomena, and that of information engineer as designer and operator of concrete institutional information systems; . . .
> . . . .
> [Theoretical informatics] examines the information system on a purely abstract level, while applied informatics is concerned with concrete information systems; . . . (p. 144)

Taylor, 1972:

> Information science is concerned with . . . the phenomena of message generation, storage, organization, structure, filters, and transfer. . . . Its objective is to explicate, to state, and to test hypotheses relevant to information systems and communication environments. (p. 152)
>
> Information engineering is directed toward the design and testing of devices and systems useful for the solution of actual problems in operating environments. Its principal concerns are the design of experiments and the evaluation of results in operating systems. (pp. 152-153)
>
> Information services . . . is directed toward . . . service functions in information centers and other knowledge dissemination systems. (p. 153)

Schur, 1973:

> By "information science" we understand the scientific foundations of the field of work and study of the information specialist, . . . (p. 8)
> . . . .
> We use the expression "information specialist" in preference to the narrower, and often misunderstood, expressions of "information scientist", "documentaliste" or "Dokumentar", or the new term "informatik", . . . In our view, the expression "information specialist" includes all these and others and is, moreover, independent of the category of work which may range from system operation to background research. (p. 7)
> . . . .
> In view of the different interpretations given to the term "information" we attempted, not very successfuly, to avoid its use,

> as far as possible, and in its place usually used the term "data" as in "data base" so as to retain the generality required for encompassing all the different types, representations and sources. (p. 8)

Neveling and Wersig, 1977:

> [Information work] means actually carrying out activities which allow information transfer and require knowledge of the handling of information (excluding all professions which are subsidiary, like pure electronic data processing, pure reprography, etc.). (p. 214)

North Atlantic Treaty Organization, 1977:

> Information Science: A broad area of multidisciplinary interests and studies that include the theoretical and technical applications in documentation, the design and operation of information systems, institutional operators (libraries, data centers, data bases, resource sharing) as well as the socio-economic, socio-political impact of information technology and policy.
> Note: The term "information science" is differentiated from "information sciences," the latter relating to the several sciences and disciplines that are included in the areas of interest to information scientists (computer science, library science, communication science, informatology).
> . . . .
> Informatics: Informatics pertains to the principles, concepts relating to the generation and application of information technology to the design and implementation of systems whose objective is processing of information, when information is considered as a process and a commodity.
> Note: This term was initially proposed by Mikhailov, Chernyi, and Gilyarevski: The process, methods and laws related to the recording, analytical-synthetical processing, retrieval and dissemination of scientific information but not the scientific information as such which is the attribute of a respective science or discipline.
> . . . .
> Informatology: Informatology is the interdisciplinary study of the basic laws, principles, that govern the phenomena of information in all of its manifestations (generation, use and transfer).
> Note: Term first used in Sweden by B. Tell in 1962. The intention was to avoid the term documentation which connotes attention to documents. (p. 8)

Brookes, 1980a:

> To justify the claim made explicit in the name the new subject has adopted, the theoretician of information science has to show that in some significant way the new science reaches beyond the current

philosophy, beyond the current psychology of mind and neurobiology of the brain to new areas and problems it can legitimately call its own.

. . . .

[Of] all the social sciences, information science is most intimately concerned with the interactions between mental and physical processes or between subjective and objective modes of thought. (p. 126)

. . . .

So the practical work of library and information scientists can now be said to collect and organise for use the records of [Popper's] World 3. And the theoretical task is to study the interactions between Worlds 2 and 3, to describe and explain them if they can and so to help in organizing knowledge rather than documents for more effective use. (p. 128)

. . . .

Much work . . . remains to be done to organize World 3 so that the objective knowledge it offers i.e. the current consensus, is more immediately accessible. Only the first steps--the classification of the artefacts--has so far been attempted. (p. 130)

Brookes, 1981:

[The] role of information science [should] be recognised to be the exploration and organisation of Popper's World III of objective knowledge.

. . . .

Just as physics is the fundamental science underlying all the physical sciences of World I, so a science of information is needed to play a similar role for all the social sciences of World II and III. Information science could play that role. (p. 11)

5.10. Definitions about Objects: To Study

[Information science is] defined as the study of the properties, behavior, and flow of information. . . . (p. 4724)

Hillman, 1965:

[It] is clear that the foundational aspects of the information sciences constitute a genuine philosophical concern. By "foundational aspects," I mean principally the study of theory construction for information storage and retrieval systems. Such systems deal with recorded scientific knowledge, the analysis of whose structure is a matter for logic and epistemology. (p. 68)

. . . .

[It] is essential to recognize that the field [of the information sciences] is trans-disciplinary. For this reason, I believe the expression "information science," i.e. a singular-noun phrase, to

be a misnomer. Many sciences contribute to the analysis of information, no one of which has exclusive rights to the title "information science." All sciences deal with information in one form or another, and the phrase "information science" leads to misleading analogies with "information theory." (p. 69)

Kotani and Ito, 1965:

"Information scientist" is one who studies and develops the science of information storage and retrieval, who devises new approaches to the information problem, and who is interested in information in and of itself. This is a completely distinct type of information specialist whose concern is with information per se rather than with information ad hoc. (p. 55)

Slamecka, 1965:

Information science is an interdisciplinary field of study of the nature, properties, control, and use of information. (p. 91)

Slamecka, 1965a:

There has been in recent years a sharp increase in the awareness of "information" as something very general, fundamental, and perhaps intrinsic to organic existence. This concept of information as a phenomenon of the biological universe applies at the level of the conscious mind (as when permitting communication, or learning), as it does at the apparently non-conscious level (for example, when "causing" heredity). Within this unified context, the study of the nature and properties of information is the subject of information science. (p. 15)

If analogies were as accurate as they are inviting, that between physics and information science might serve well: physics studies the nature and properties of matter, information science the nature and properties of information. Even the questions information science asks are analogical to those asked by physics, for example: What is information? Is information a physical symbol which somehow carries, assumes, or imparts "meaning"? Or is information a property of the symbol, determined by its configuration? or can it perhaps exist in both forms? Is there, or can there be, a basic unit of information? and so on. . . . (pp. 15-16)

. . . .

Depending on whether people think of matter as energy, or atoms, or molecules, or structures, they study light, chemical elements, plastics, or steel girders; and depending on whether one regards information as a property, or a symbol, or an answer to a question, or recorded texts, one can study DNA, coding systems, problem-solving storage and retrieval models, or optimization of library services. There is a continuance of information science (and here the word "science" begins to lose its appropriateness) in the applied domain; here it is concerned essentially with the control of information and its use in society. (p. 16)

Donohue and Karioth, 1966:

> Information science was fathered . . . by the concern for information transfer.
>
> . . . .
>
> The change in emphasis from science information to a science of information has left some observers wondering. . . . There are those . . . who believe that no true science will emerge, that the field will always remain a collection of disparate disciplines coming together to solve practical problems. (p. 117)
>
> . . . .
>
> The information scientists have amassed a considerable body of knowledge about the properties, behavior, and flow of information. (p. 119)

Hayes, 1969:

> Information science is the study of information-producing processes in any information system in which they may occur.
>
> . . . .
>
> [Information science is] in principle . . . concerned with pure analysis of processes, in reality it cannot be separated from the methodology of specific disciplines. It is therefore more appropriate to talk in terms of "information science in genetics," or "information science in social theory," or "information science in documentation" than to talk of "information science" in isolation from specific systems.
>
> . . . .
>
> An information system is that set of aspects of a general system (a natural phenomenon, a physical construct, or a logical construct) which are identified as information-producing.
>
> . . . .
>
> Information is the data produced as a result of a process upon data. That process may simply be one of transmission (in which case, the definition and measure used in communication theory are applicable); it may be one of selection; it may be one of organization; it may be one of analysis. (p. 363)
>
> . . . .
>
> That a social system or biological system can be regarded as an "information system" may seem somewhat unnatural, at least in the sense we will use here. But it is clear that each performs processes upon what we can regard as data (symbolic represetations). For example, an elected official can be treated as a symbol of his constituency. There are clearly defined mechanisms for selection of such symbols and these constitute "information-generating processes." Similarly, the "genetic code" is simply arrays of amino acids, but these can be regarded as data (symbolic representations). Economics is concerned with processes upon symbols of capital; psychology, with processes upon symbols of response, etc.
>
> Each of these is therefore a proper domain for information science to study. (p. 365)

Brookes, 1972a:

> [Information science] is the scientific study of information phenomena. . . . [Information] already has one measure--that provided by Shannon--which, when the present confusions are forgotten, will be seen to be a cornerstone of the new science. (p. 274)

Ember, 1972:

> "Information science" has been exposed perhaps more than its due share to the pains of linguistic purification. The quest for an airtight definition quite often has projected the image of a rather dubious craft which once posses as "information science", another time as "documentation", "informatics" or something else. Thus, the term became sometimes mystified by a juxtaposition with its own synonyms or with its broader and narrower sets of characteristics.
> . . . .
> As Hayes and Becker [1970] suggest, this field of knowledge is vast, diversified and composed of several types and levels of activities: "Information science is the study of information producing processes in any information system in which they may occur." (p. 137)

Leska and Leski, 1972:

> Informatics (1)--a scientific discipline whose main object of research is sources of information, regularities of information processes and principles for their opimization, as well as methods and means used in information activities
> Informatics (2)--a system of scientific and technical disciplines studying computer-based conversion of data (p. 317, quoted by Chernyi and Pashchenko, 1974, p. 297)

Otten, 1972:

> One expects from a science of information a scientifically derived understanding of whatever is the common basis of information, information in the widest sense of the word. (p. 92)
> . . . .
> [Whenever] we refer to one or another aspect of information, we are referring to knowledge and the nonphysical aspects of actions or interactions which take place within or between man, nature, and the man-made world. We may consequently consider information as the common descriptor for all nonphysical aspects and interactions between and among man, machines, and the universe and as the common descriptor for knowledge, the latter being the image of the subset of the universe which is accessible to and has been intellectually perceived by man. (p. 95)
> . . . .

. . . .

An issue of fundamental importance for the basis of a science of information is the interdependence of matter, energy, and what we refer to as information.

Three operations can be performed on information: storage, transmission, and decision making. None is observed in isolation: All manipulations of information involve these three operations interdependently. However, there appear to be operations which are predominantly storage or memorization, transmission or communication, decision making or processing. (p. 102)

. . . .

Common to all three operations is the manipulation of matter or energy. Consequently, the operations per se are indirectly subject to physical measurement. This suggests a strong relationship between information and the material universe. (pp. 102-103)

Stone, 1972:

[Information science] is the study of "event records" to determine their intrinsic nature, interrelationships, relation to the outcomes of recording events, and related dissemination activities.

. . . .

To me, information is an event noted and/or recorded. (p. 285)

Watanabe, 1973:

[Information science] is not a science of information but a science of how to get rid of (useless) information.

. . . .

"Information is a proposition(s) extracted deductively or inductively from raw data so as to diminish its (their) quantity and to increase its (their) usefulness for goal-seeking actions. The method of taking data and the concepts used to formulate propositions should be oriented to achieve this condition." (p. 119)

. . . .

This definition makes clear that information is not a purely objective entity. Information is the result of an interplay between the objective and the subjective, or between the empirical and the rational. (p. 120)

Adams and Werdel, 1975:

The Russians have defined "informatics" as a branch of the social sciences; with respect to its international dimensions at least, the field of scientific and technical information can fairly be called a branch of the political sciences.

. . . .

Information, in short, is being looked at as a source of power, and wherever power exists, political interest follows. (p. 336)

British Standards Institution, 1976:

> Informatics. The study of the structure and properties, but not the specific content, of scientific information as well as the regularities of scientific information activity, its theory, history, methods and organization. The term first gained currency in Eastern Europe and has recently been adopted by the International Federation for Documentation (FID). (p. 34)

Slamecka and Ralston, 1976:

> The term information science was coined to designate an interdisciplinary field initially concerned with the exponential growth of recorded scientific information.
>
> . . . .
>
> In the 1960s, the thrust of applied information science focused primarily on the handling of bibliographic records and textual information in science and engineering. Two major foci of effort received considerable attention: the study of the communication processes in the communities of science and industry; and the development of techniques and systems for more efficient organization, storage, and dissemination of recorded scientific information. The term "informatics," synonymous with these two directions of effort, was coined in France (informatique) and popularized after its adoption by the USSR and the Soviet bloc countries; . . . (p. 656)
>
> . . . .
>
> As a basic science, information science has only begun its search for content and structure. The main direction of this incipient effort in the United States, the USSR, and western Europe is that of semiotics, the study of sign phenomena. (Signs are entities that signify some other thing, called the "object" of the sign, and can be interpreted by a sign interpreter.) This direction includes investigations of the static structure of signs--as represented by fields such as semantics, information theory, and complexity theory--and the study of dynamic sign processes (semiosis) that transfer or transport sign phenomena. In this setting, information science is of metadisciplinary import, . . . (p. 657)

Slamecka and Pearson, 1977:

> [The] theory of sign structure proposed here constitutes, in part, a new language suitable for explicating, empirically, a number of information phenomena, processes, and partial theories. Our research thus aspires to be an early contribution toward the establishment of a science of information. (pp. 105-106)
>
> . . . .
>
> In information science, the need for better understanding of the concepts of information measures and measurement is well recognized. Our approach to the study of information measures and measurement is from the viewpoint of semiotics, the study of signs and sign processes. The role that signs play in information processes

(that is, in semiotic interactions) is determined by the properties of the sign; in turn, sign properties are determined by the kind of sign and its structure. From this viewpoint, we regard an information measure as any observable property of the sign structure; and the measurement of information as the development of a measurement system for carrying out the observation of that property. (p. 106)

Slamecka and Gehl, 1978:

[The] past fifteen years have ssen attempts at structuring a broader new field of knowledge; now we label these resulting structures "computer science", "information science", "systems science", "computer and information science", "information engineering", "library and information science", "information systems science" "communication science", and perhaps others.

. . . .

If there is to be a basic discipline called information and computer science, it would seem that the denominator underlying its structure should be some general principle or a phenomenon occurring as a primitive in the universe. It is unlikely that this denominator is the computer . . . [or] a complex process (such as computing, or problem solving, or communication) or its representation (the algorithm) . . . [or] provision of services--e.g. more effective bibliographic access. Intuitively, it would seem that the basic phenomenon in information science is "information", but the definition of information keeps eluding us. Perhaps we need to decompose information-related problems into more basic elements such as signs. Signs appear to be a basic primitive and phenomenon, the atomic element of information processes and other higher structures.

. . . .

- Lately the theoretical part of computer science appears to be leaning to the view that the central idea of computer science is information; and that . . . the proper domain of computer science is the study of representation, transformation, and interpretation of information structures which may be thought of as the counterpart of syntax, semantics and pragmatics. (p. 356)

. . . .

As scientific endeavors motivated by the desire to understand, information science and computer science thus seem to be converging, from initially different positions, toward a consensus on the information-related nature of their enterprise and their place in science.

. . . .

Nevertheless, the label "information and computer science" belies the fact that many of the interests and activities under its umbrella are blatantly technological. . . . [The] technological preoccupations heavily outweigh the theoretical effort. (p. 357)

Pearson and Slamecka, 1979:

> [A] field which we believe lies at the foundation of information science qua science . . . [is] quantitative semiotics, . . .
> . . . .
> We have ofucsed on an investigation of signs because in our experience all fundamental questions pertaining to information processes invariably boil down to the problem of understanding the nature and the structure of signs. (p. 7)
> . . . .
> As the common denominator of these efforts [of the study of signs and sign processes] is the study of information processes, the notion of an "information science" as the envelope for these studies is appropriate.
> . . . .
> Our approach to the study of information measures and measurement is from the viewpoint of semiotics, the study of signs and sign processes. The role that signs play in information processes (that is, in semiotic interactions) is determined by the properties of the sign; in turn, sign properties are determined by the kind of sign and its structure. From this viewpoint, we regard an information measure as any observable property of the sign structure; and the measurement of information as the development of a measurement system for carrying out the observation of that property.
>
> Our purpose in developing a theory of sign structure is to have a tool for explicating the nature of information measurement and its relationship to semiotic processes, and for classifying information measures according to their semiotic dimensionality and interrelationships. (p. 8)
>
> . . . .
> In the future, information science should develop more refined theories of sign structure, particularly ones capable of predicting quantitative phenomena. To do so, information science research must focus heavily on the fundamental questions of sign structure and sign processing, both from the experimental and the theoretical side. In our opinion, significant progress along these directions may establish information science as a new paradigm for an alternate group of sciences. (p. 19)

Hayes, 1980:

> [Information science] is the study of information-producing processes in any information system in which they may occur.
> . . . .
> An information system is that set of aspects of a general system (a natural phenomenon, a physical construct, or a logical construct) that are identified as information producing.
> . . . .
> That a social system or biological system can be regarded as an "information system" may seem somewhat unnatural. But it is clear that each performs processes upon what we regard as data (symbolic representations).

. . . .

Information is a property of data resulting from or produced by a process that produced the data. The process may be simply data transmission (in which case the definition and measure used in communication theory are applicable); it may be data selection; it may be data organization; it may be data analysis. (p. 249)

Zunde, 1981:

Information science is an empirical science, since it is basically concerned with empirical phenomena: generation, transmission, storage, and transformation of information. (p. 1)

. . . .

In this chapter we have collected laws and hypotheses which pertain to the nature of information in all kinds of texts as well as to phenomena associated with information production, processing, dissemination, storage and various facets of information use. (p. 64)

6. Definitions about People

6.1. Definitions about People: To teach

Cheydleur, 1965:

The scale of activity in Information Science and Retrieval [is] unique in the twentieth century, . . . The immediate availability throughout the world of all information files [by means of computers] will engender continual review and evaluation in the scientific spirit that welcomes reexamination of any data without fear. In liberal education, there must be a responsibility to prepare minds for this regimen in the world of scholarship of the 1970's, . . .

. . . .

The linkage between information science and liberal education is so obvious, and yet so unexplored at the present time, that the prospects are a matter of conjecture. (p. 171)

Heilprin and Goodman, 1965:

Both information storage and retrieval (ISR) and education (E) deal with the communication of ideas--messages. The messages which E conveys are of two kinds--informative or cognitive, and controlling or training. This analogy is mainly to the cognitive aspect: messages which convey information. (p. 13)

Hays, 1971:

> [There] is one goal that information scientists are eligible to pursue without financial or intellectual support; they can work at it in private places, during quiet hours. Whatever part of it they accomplish will be applauded by their colleagues, by their clients, and by philosophers. (pp. 10-11)
>
> The goal is to write a Reader's Companion, a manual of civilization. It would be a work of several thousand pages, stating briefly all the basic ideas of western and other cultures, and how they are connected. Religious, moral, scientific, aesthetic, social, and political ideas would be there, with pointers to the library.
>
> Previous attempts to reach this goal suggest that it may be best to leave this summary of all knowledge in the realm of the ideal, and not make it actual. Even so, it is a metaphor that helps the documentalist, the practitioner, engineer, or scientist of information remember where his work fits into the human scheme. He is a winnower, an organizer, a rememberer, a reminder, an educator. (p. 11)

6.2. Definitions about People: To enlighten or inform

United Nations Educational Scientific, and Cultural Organization, 1951:

> By documentation is meant the whole complex of interrelated activities and techniques which conduce 'collective thinking with collective memory' among all those concerned with any given subject in all countries. (p. 209 in American Documentation 6 (October, 1955)

Wooster, 1963a:

> The predominant usefulness of future information processing systems will be in aiding the human in ordering and filtering and interpreting extremely complex situations and to propose to him, or even make for him, decisions that he could not arrive at rationally, in the face of the abundance of the inter-related factors that exceed his own capability of evaluation. (p. 151)

Licklider, 1972:

> The next issue . . . is whether we are talking about a meta-science, a science for technology. (p. 453)
>
> . . . .
>
> [The] goals in research cannot be nearly as vast as those in technology and engineering. You simply do not create vast systems without a pretty clear notion of what it is that you are trying to build. (p. 454)

. . . .
I believe that motif [for motivating and putting dynamism into information science] could be an electronic information network that would relate to how governments work, how international alliances work, how businesses work. It would show how all problems of communication between organizations could be cleared up. If a group like this really took the time to formualte such an objective as its aim, it might be able to put together the greatest classification scheme that the world has seen. (p. 457)

6.3. Definitions about People: To study human cognition

Farradane, 1967:

[Information science covers] in the broad sense with which the term is used in Britain . . . all information work activities. . . . The field can be regarded as a combination of the communication of knowledge and the organization of knowledge. The nature of knowledge, in its various forms is the fundamental problem. Knowledge is the product of human activity. . . . The problems cover not only the structure of knowledge as produced by the mind, but its transformations and limitations when converted into writing, speech, drawing and pictures, and also into mathematical form. The further transformations that are liable to occur on transference of the knowledge from one form to another and eventually to another human mind also require study. . . . Closely related to these problems are also those of the receptivity of people for new knowledge, of the reading and learning habits and capacities of people. Eventually the processes by which new knowledge is attained (research) and the methods of primary publication must be studied in relation to the information problems, and methods of integration be achieved. (p. 249)

Office for Scientific and Technical Information (OSTI), 1967:

Basic research in information science includes any work designed to increase knowledge of the ways in which information can be organized for assimilation by human beings. (quoted by Gilchrist, 1972, p. 321)

Harmon, 1971:

Last, information science might well be concerned with ways to overcome the more debilitating effects of human short-term memory limits in problem-solving.
. . . .
Presumably a task of information science is to ease the burden of comprehension. (p. 240)

Farradane, 1976:

> We shall now no doubt have to live with the term 'information science', but we must make it clear that we shall be studying both knowledge and information and their interconversion. It must also be made clear that the knowledge involved is not only knowledge about the sciences, but probably about any subject. The processes of interconversion involve the problems of meaning, and meaning can now be defined as the relation of the initially produced, or finally transmitted, information to the original thought of a communicator, or to the thought induced in a recipient, respectively. The meaning of the information at intermediate stages of communication may perhaps be studied by introducing an intermediate recipient, who will also become a secondary communicator, but such intermediate treatment obviously introduces a chain of complications. (p. 100)

Brittain, 1977:

> Sometime in the future information scientists may be concerned with the way in which users 'process' the information and data that is conveyed to them. Information scientists may be interested and get to know about the way in which new information is filtered and merged with information and knowledge that already exists. This would involve a consideration of problem-solving, creativity, and the way in which information processing goes on in the brain of users. These are exciting possibilities and not without a good deal of relevance to information transfer services. (p. 39)
>
> . . . .
>
> We have been saying that information science, if it does exist as a subject in its own right, has something to do with problem-solving, knowledge structure, the accumulation of knowledge, the content of documents (rather than the documents themselves), and the relationship between documents, but is not primarily concerned with bibliographical aspects of documents. (p. 40)

Harmon, 1979:

> This writer views the emerging information professionalism as a <u>set</u> of occupational groupings that have as their locu the electronic and neurolinguistic structuring, capturing, remembering, communicating and synthetic or analytical utilization of relevant data, information or knowledge. Alternatively, information professionalism can be regarded as that type of focal endeavor that <u>first</u> provides cognitive structures, forms, or models for the support of inquiry, planning, problem-structuring, and decision-making, and <u>secondly</u>, provides for the assimilation of data, information and knowledge into the appropriate structures, forms, or models. (pp. 98-99)

6.4. Definitions about People: To study knowledge

Kochen, 1972:

> Information science, both in the broad and in the narrow sense, has a central concern with the growth of knowledge, understanding, and wisdom. Information is useful for its role in coping with problems. It is the raw material for knowledge, which is information processed with a point of view, through a representation. (p. 181)
>
> Information is transferred from the environment to the "learner" where it is used to revise a representation and to help utilize such a representation for selecting actions. (p. 182)
>
> . . . .
>
> Information is not only stored, communicated, and processed. It is utilized for problem solving, for control, and steering. Above all, information represents, and information is represented. (p. 171)
>
> . . . .
>
> Information science in the narrow sense began with documentation--mainly in chemistry--on the one hand and information retrieval on the other. (p. 181)

Rathswohl, 1973:

> The argument is that science and design are themselves human inquiry activities in complex environment and therefore should not just be the basis for information science but part of the discipline's subject matter as well. (p. 40)
>
> . . . .
>
> [Information science] interests must shift from just the information product aspects of information production to include also the design of the research process itself. Indeed, information science would play an important role in science , that concern being how to go about facilitating and improving the process of science research. (p. 95)
>
> . . . .
>
> [The] critical task of informatology would be to determine the 'progress' of information system design activities in terms of how they contribute or detract from real-world, holistic, democratic inquiry. (p. 255)

Pagianol, 1976:

> Perhaps, at the moment, it is Utopian to dream about a kind of documentation that is a philosophy of knowledge, a theory of its evolution, a discoverer of its implications, and a curator of special languages--all at the same time. But we must recognise that today there are already numerous signs heralding the approach of this new era in documentation. (p. 16)

Slamecka, 1978:

> The goal of the new information world is to bring knowledge to bear more effectively on the solution of purposive problems of man and his organizations--not only in science and engineering but in all sectors of prudent social activity. The two most general goal-seeking strategies are 1) to enhance the utility of existing knowledge; and 2) to improve the process and efficiency of generating new knowledge. The former strategy lies within the purview of the traditional information profession; the latter is in the province of information and computer science, and in that of many other problem-solving disciplines.
>
> These strategies are brought to fruition and reality through the design of "information systems"--complexes of considerable and growing variety as regards their purpose, power and size. (p. 458)

6.5. Definitions about People: To conduct research and advance knowledge

Kent and Lancour, 1963:

> [Information science is] "a branch of study concerned with the observation and classification of facts, leading to the establishment of verifiable general laws dealing with knowledge derived from reading, observation or instruction, especially unorganized or unrelated facts or data." (p. 111)

Kent, 1964:

> It is possible to hypothesize a definition for information science which reads: "a branch of study concerned with the observation and classification of facts, leading to the establishment of verifiable general laws dealing with knowledge derived from reading, observation or instruction, especially unorganized or unrelated facts or data."
>
> Is this really what we are talking about? This image created by the term "information science," matched against the embryonic manifestations of the field, causes us to wonder whether "information" is what we really mean, and whether the way we are going about work in the field is really scientific. We would propose a label that we will tentatively call "communication science," or if we may become quite radical, "library science," which would be somewhat more palatable at our present stage of thinking. (p. 31)

Schober and Wersig, 1969:

> The real problems with which the science under consideration has to deal do not rest in the furtherance of the collection, arrangement, and utilisation of literature and data since it is obvious that this labour must diminish. (p. 35)
>
> If this science wishes to attain its objective then it must attempt to intervene actively and critically in the production of data so that the resources used for irrelevant and redundant data production and dissemination are redirected for maximum social effectiveness. The problem we are facing is not the financing of documentation units but the orientation towards production of factual data.

Belzer, 1970:

> Information science encompasses many notions, ideas, concepts, principles, and techniques. It relates symbols, words, and language to the world about us. It permits us to hypothesize about the structure of the universe, forecast about future events, and extend knowledge.
>
> . . . .
>
> Almost everyone with whom I come in contact has a different notion or idea of what information science is, and I have come to believe that it is all of these things. Information is many things. In Helen Keller's story . . . suddenly she relates w-a-t-e-r to water itself, and just as suddenly, she beings to relate to the world about her. Even emotions of love become meaningful to her. This is what we mean by information. Life itself is dependent on our ability to acquire information about the world about us. We extrapolate from what we learn and give structure to our world to survive. The communication process permits exchange of information, and thus, by inductive inference, new concepts are formulated that bring about an extension of knowledge. (p. 269)

Harmon, 1971:

> One task which could possibly further the completeness and internal development of information science would be the addition of needed subsystem components [such as] . . . general systems theory, forecasting, and a science of research. . . . [A] "science of research" could be an intrinsic but latent part of information science. . . . But other additions . . . could be important to the development of information science. The problem of "what is missing" in information science awaits resolution.
>
> In addition to its self-development, information science might be concerned with outside developmental and integrative tasks aimed towards the communication and behavioral sciences and other large systems within a potentially emerging suprasystem of knowledge.
>
> . . . .

. . . .

Information science appears to have emerged not only as an expansion and metamorphosis of documentation and information retrieval; it directly or indirectly incorporated or paralleled several prevailing objectives and concepts of the communication and behavioral sciences and other contributory disciplines. (p. 240)

. . . .

The programmed development of information science might embrace more the science of research which has possibly existed as a latent component of information science. A potential long range role for information science involves active participation in forming a complete suprasystem of knowledge which would unify the arts, sciences and professions. Last, information science could strive to overcome the limitations of human short-term memory and thereby increase the scope of human comprehension. (pp. 240-241)

Kunz and Rittel, 1972:

Information Science is a forerunner among the problem-oriented disciplines engaged in the production of change. . . . Organizing the discourse about what ought to be accomplished is an information problem. It is the central issue of information science. (p. 98)

6.6. Definitions about Objects: To control knowledge

Nil additional.

7. Definitions about Objects and People

7.1. Definitions about Objects and People: To make accessible

Bradford, 1948:

Documentation is the process of collecting and subject classifying all the records of new observations and making them available, at need, to the discoverer or the inventor. Without documentation, the recorded observations are merely scattered items, separately of little use, which get buried in the great mass of scientific literature, . . . (pp. 9-10)

. . . .

Scientific progress needs that new facts, new discoveries and the new inventions resulting from them, should be made available immediately. For this purpose, ordinary books and lists of books are useless. Books are for the study of a

subject, not for its evolution.

[New] observations are recorded in scientific and technical periodicals. We need the means of assembling all these new facts and of sorting them, according to their minutely particular aspects, so that we can find out, at once, all those relating to the special subject that we wish to study. This is the province of the art of documentation. . . . (p. 10)

. . . .

Documentation is an art of practical necessity . . . towards the progress of society. For progress depends on access to recorded information. And the art of documentation is the art of collecting, classifying and making readily accessible the records of all kinds of intellectual activity It is the process by which the documentalist is enabled to put before the creative specialist the existing literature . . . in order that he may be made fully aware of previous achievements in his subject, and thus be saved from the dissipation of his genius upon work already done. Documentation proceeds from the need to put in order the processes of acquiring, preserving, abstracting and supplying, as requested, books, articles and reports, data and documents of all kinds. It is the result of the realisation of the gap between the making of a record in any sphere of activity and the placing of that record in the hands of the individual who can use it as the basis of new achievement. The principal medium for recording progress is the periodical press, which speaks in so irregular and incoherent a manner, that it is impossible, without documentation, to obtain a clear and concise view of any particular branch of knowledge, large or small. (p. 11)

Taylor, 1963a:

[The] scientific community has developed many means to circumvent the library in order to obtain the information it needs and wants. The information sciences explore this entire matrix of specialized communication, both formal and informal, in order to understand and to develop effective means of making knowledge available. (p. 4162)

. . . .

[The] concern of the information sciences is to understand and to improve the total complex of scientific communication, . . . (p. 4163)

Borko and Doyle, 1964:

Information retrieval is the total process of gathering, analyzing, indexing, filing, and making available--by dissemination or in reponse to specific requests--items of recorded information. (p. 3)

Kent, 1966:

> "Retrieval," as used in the phrase "mechanized information retrieval," has come to mean more than the standard dictionary denotation, i.e., looking through or exploring thoroughly in order to find something. Today any mechanized processing of recorded knowledge has been considered, for better or for worse, to be "mechanized information retrieval." The processing may merely speed accession, or it may lead to an orderly arrangement of recorded knowledge so as to provide more convenient access by future human users. (pp. 19-20)
>
> . . . .
>
> ["Mechanized information retrieval"] will designate the use of mechanized or other nonconventional tools in connection with any one or more unit operations [of an information retrieval system]. (p. 20)
>
> . . . .
>
> [A] machine is the organization of the powers of any complex body. This definition implies that a machine is to be considered as more than a single physical device, but rather as a system that consists of interacting parts. Some of these interacting parts may be devices, some may be human beings, some may be procedures. (pp. 18-19)
>
> . . . .
>
> Information in this widened sense may, in certain contexts, include artifacts, inscriptions, and decorations which are the records of the anthropologist and the historian. Such records may vary in form from that of the Dead Sea Scrolls to the Rosetta Stone. In the field of information retrieval, the word "information" is usually restricted to designate documents (or other graphic records) which record this information for later reference and use. . . .
>
> We may consider as information any recorded knowledge that may be useful to some decision maker. (p. 19)

Maltha, 1967:

> [Documentation:] the recording of publications in some sort of system so that information could be obtained on any subject at any moment. . . . As would be expected the problem of accessibility of the literature was also diverted to the documentalist. (p. 18)

Fairthorne, 1969:

> [Documentation] science studies discourse as such, and as it is. It does not study the topics of discourse, in the sense of verification or certification of statements made by the discussants. A library is not a laboratory. It does study who talks about what, and who requests what has been said, and in what terms. Applied documentation seeks means to obtain and supply reocrds of what has been said about various matters or by various people to those who may request it.
>
> . . . .
>
> [Documentation] is mostly concerned with semantics and pragmatics, . . . (p. 28)
>
> . . . .

> Records are representations of what has been said by someone to be said to someone else, or about which someone may request to be told. (p. 25)
> . . . .
> [Applied documentation] uses documentary knowledge and techniques to make appropriate records available in modes appropriate to the particular application. (p. 27)
> . . . .
> To sum up, Information Sciences, Technologies, and Activities, (ISTA), centre on the knowledge and services needed for effective discourse by other people. . . .
> At present, ISTA is more a federation of technologies than a set of specialist activities developed from common principles. (p. 31)

Tou, 1969:

> In our complex and technologically-oriented society organizations are flooded with an enormous amount of management information. We are now faced with problems concerning the efficient use of communicated knowledge. The steady growth in the magnitude and complexity of information systems necessitates the development of new theories and techniques for solving these information problems. We demand instant access to previously recorded information for decision making, and we require new methods for analysis, recognition, processing, and display. As a consequence, information science has evolved out of necessity. (p. vii)

Vaswani, 1969:

> An information retrieval system is therefore defined here in terms of its response to a request for information. In their raw state, requests will usually be expressed in natural language, which may not always be a suitable form for input to a mechanized system.
> . . . .
> It is assumed that the store contains a collection of <u>information items</u>, or a collection of <u>descriptions</u> of such items. An information retrieval system is then one which compares the specification of required items with the descriptions of the stored items and retrieves, or lists, all the items which correspond in some defined way to that specification.
> . . . .
> Information storage is one of man's most fundamental activities. The only reason for storing information is to make it available when required at some later point in time. Retrieval of information is therefore an equally fundamental activity, occurring whenever a fact is withdrawn from human memory and whenever we refer to a map, dictionary, telephone directory, diary, textbook, scientific report, etc. (p. 223)

Swanson, 1970:

> [Human information processing and information systems] are viewed as social structures amenable to analysis according to systems engineering principles broadened to take account of psychological and sociological factors.
> . . . .
> Today's mechanized systems for storing, retrieving, and disseminating information . . . are able to furnish a sometimes bewildering assortment of listings and publications disclosing the information they contain and can provide access to.
> . . . .
> The principal objective of most systems is the provision of information services to a group of users. (p. 351)
> . . . .
> [Systems] engineering has behavioral components. (p. 354)
> . . . .
> Research in the behavioral sciences that pertains to the human as an information processor is usually referred to as communications research. (p. 355)

Artandi, 1972:

> Other areas of information science try to probe deeper, to discover knowledge that will help to understand better the behavior of information systems. It seeks to find answers to such questions as: What is information and what is its relationship to knowledge? How is information transferred? What is the value of information and what are some of the behavioral patterns that relate to the use of information? How much information can be processed and tolerated by an individual? (p. 17)
> . . . .
> Most systems that are loosely referred to as information retrieval systems are, in fact, document retrieval systems because they do not provide direct access to the information itself. Instead, they are designed to retrieve documents which should, with some degree of certainty, contain the desired information. (p. 26)

Laclemandière, 1972:

> Informatics of information, or documentary information practically devoid of algorithms, must be distinguished from computing and management informatics (data processing). To this end the content of information must be "stored" with minimum loss and made accessible for people turning to this "memory" in order to find the most precise and relevant elements of answers, in adequate conditions and at reasonable costs.
> Documentary informatics is confined to the processing of files which possess but a minor part of the information contained in documents, because they are unable "to store it" all. (p. 154)
> . . . .

> The training of informers implies more particularly the rational and harmonized practice of five functions: detection or gathering of documentary sources, identification, content analysis (abstracting), dissemination and storage of ideas and documents. (p. 158)
>
> . . . .
>
> Management consultants, information scientists, and documentalists have at least two characteristics in common: They must rationalize and optimalize information flows. (pp. 161-162)
>
> . . . .
>
> Information relating to management is meant to be all that contributes to the development of this concept in terms of books, reports, journal articles, seminars, workshops and sessions. (p. 162)

Wellisch, 1972:

> Although originally meant to signify only the operations necessary to gain access to recorded knowledge irrespective of the form of documentary carriers and aimed at making a distinction between the physical and mental activities that have to be carried out to this effect . . . [information retrieval] became an "in"-word, and . . . the term supplanted "Documentation" almost entirely, and became virtually equivalent to the European idea of "Documentation". (p. 161)

Kugel, 1973:

> We need to provide a service that identifies the users' needs and helps to meet them--not the needs we <u>think</u> the users have but their <u>real</u> needs. . . . We need to understand what people are trying to do when they try to access or transfer information.
>
> . . . .
>
> There is, today, no . . . viable theory of information transfer.
>
> . . . .
>
> We simply don't know what it means to transfer information from one person to another, so that it is not surprising that we don't know how to do it well or help others do it better. (p. 128)

Arntz, 1974:

> Belief in a single world of knowledge and the wish to have at hand in a world center everything that has been devised, explored, discovered, and invented by mankind in thousands of years were the original ideas behind the inception of the International Federation for Documentation (FID).
>
> . . . .
>
> [Paul Otlet and Henri La Fontaine addressed] themselves to the task of organizing world knowledge in the form of a classified central card catalog of the literature, illustrations, and institutions of all countries, ages, and languages. . . . [The] idea to place world knowledge in systematized form at the disposal of a person

faced by a decision before that decision is taken is still the FID's governing principle, . . . (p. 377)

. . . .

For Otlet and La Fontaine, the international (later, worldwide) bibliography was the cornerstone of international peace and a universal classification system the golden key to the universal bibliography. (p. 380)

. . . .

In 1931 the IIB [International Institute of Bibliography] changed its name to Institut International de Documentation (IID). It was more than a change of name: it signified turning away from the world bibliography and turning toward practical activities which in this period were for the first time outside the scope of library arrangements. They included reprography. (p. 382)

. . . .

[As] early as 1959, as in all subsequent discussions, FID was debating whether "documentation" still covered the task or whether the term "information" must be adopted (either as scientific information, information and documentation, documentary information, or whatever else it might be). FID considers it unnecessary to relinguish the term "documentation," since the advocates of other terms have not so far associated any other tasks which FID does not consider as falling under documentation. (p. 388)

. . . .

The IIB had adopted the word documentation much earlier (in 1905) than is frequently assumed, and what is most surprising is that even the first publication on the subject bestows an identical meaning on information and documentation in order to express the whole of the field they cover [L'Organisation rationelle de l'information et de la documentation en matière économique, Rapport présente au Congrès International d'Expansion Economique Mondiale de Mons, by Paul Otlet, IIB, Brussels, 1905]. (p. 395)

Diemer, 1974:

On the one hand this term [information science] denotes the whole complex of institutions, activities, apparatusses, etc. which in some way has something to do with "information". Accordingly an "informator" can be regarded as a person who in general is not active scientifically but functions as an intermediate of information (e.g. an indexer, retriever). However, there is one additional point: when speaking about "information" or "information systems" and the like, then, in most cases . . . systems are meant which render possible "scientific information", or, more specific "information on scientific facts" and the like. . . . [What] is concerned is the area of human activities, which, according to general belief . . . is regarded as the "collecting, evaluating, ordering, storing, retrieving and providing of information". (p. 193)

From this preliminary characterization some essential consequences follow: in a negative sense it is excluded that we are here concerned with primary research, as e.g. in the area of biology ("hereditary-information") or of mathematic ("information theory") etc. Rather we are concerned here with the collecting, processing and making

available of whatever is understood by information, such as news items, representation of facts, knowledge, etc. (pp. 193-194)

. . . .

[Information] is not a primary production of text: the informator does not produce primary texts e.g. articles, reports, etc. as perhaps the writer or the scientist or the journalist also--and here the discussion starts--since information activity is always concerned with given text products which it wishes to mediate: the first decisive step--well known--being the indexing process. (p. 199)

Smith, 1974:

Briefly, Information Science is concerned with how man communicates with man. It is the study of how information is transferred--from the point of generation to the point of use--and all the intermediate steps of collecting, organizing, interpreting, storing, retrieving, disseminating and transforming information. As a discipline, Information Science stresses the application of modern technologies to the handling of information. (p. 78)

. . . .

As information scientists we are concerned about the large investment necessary to develop information utilities that permit economical on-demand access to information. . . . We are concerned about the effects and impact of information technology on the culture of our people. (p. 80)

. . . .

The focus of information activities and programs must be redirected from concern with document handling to the needs of the user. (p. 81)

Krippendorf, 1975:

Literature on information retrieval is concerned with the principles for designing devices that <u>store information</u> and <u>respond to user's requests</u> by making the <u>desired information</u> available. (p. 17)

. . . .

It is the user who behaves as a function of both the current situation and information provided from the past. Information retrieval devices store information about past events and respond to the user's request by making past information selectively available. Memory then becomes manifest in the man-machine interaction, which the user typically initates. (p. 18)

Piganiol, 1976:

The purpose of documentation is to provide access to the stock of human knowledge. Simplifying the matter to the point of absurdity, one could say that its job is to handle human knowledge as if it were a commodity stored in a warehouse.

. . . .

The paradoxical fact, though, is that the commodity in question is mental and abstract, and can be grasped by documentation solely

through the medium of "documents". . . . Documentation, then, is an attempt to reduce knowledge to simple items of information, which alone can be processed--that is, pieced together.

. . . .

[Documentation] seeks to select the documents that effectively contribute to knowledge. It eliminates the repetitions, popularisations and abstracts, and gives pride of place to the "primary" documents. On occasion, however, it does the opposite, for example, providing references to a popular science article requested by the reader. Here documentation acts as an agency which takes upon itself to judge the "value" of documents, proceeding from the multitude of often contradictory criteria of the various categories of users. (p. 15)

Salton, 1976:

Information retrieval (IR) is concerned with the structure, analysis, organization, storage, searching, and dissemination of information. An information retrieval system operates on the one hand with a stored collection of information, and on the other with a user population desiring to obtain access to the stored items. (p. 649)

Docuprocessing Publications, 1977:

Information management is most broad in connotation as it encompasses all information handling methodologies, economics of information, information systems analysis, information networks, personnel supervision, information privacy, information science, administration and information policy. (p. 3)

. . . .

In the final analysis, the successful information manager will be the one who consistently makes available the right information at the right time. This will happen through the planning, design, and coordination of better communications processes which generally will be achieved by applying a systems approach. (p. 4)

Maron, 1978:

[The] larger field of information retrieval divides into document retrieval (also called "reference" or "citation" retrieval) and data retrieval (also called "question-answering"). (p. 7)

. . . .

[The] purpose of a document retrieval system is to accept subject (topic) requests in some appropriate form and to search for and select from a large corpus of stored documents all and only the relevant ones (or citations to those documents). (p. 5)

. . . .

The current state of theory and foundations in the field of information retrieval is undergoing important growth and development. And one day soon we shall have sophisticated theories (and techniques)

> of information retrieval applied to advanced technology in order to produce very effective systems for obtaining access to recorded information. (p. 9)

7.2. Definitions about Objects and People: To retrieve

American Documentation Institute, Ad Hoc Committee, 1955:

> [A] definition should encompass both theory and practice, emphasize the quadruple aspect of production, organization, retrieval, and dissemination, and suggest the social implications of these activities. (p. 254)

Grosch, 1956:

> Now, what is the process that makes information retrieval valuable? I think it is the association of remote ideas. . . . And it's these associations of radically remote ideas that really give us value. The exhaustiveness of high-speed machines makes this possible. (pp. 195-196)

Bernier, 1958:

> I consider that information storage and retrieval systems are made up of three components:
> 1. The contributors to the system,
> 2. The media of communication (which in documentation systems consist of a storage element and selectors),
> 3. The users of the system.
> I consider that "environment" includes all three components. (p. 190)
> . . . .
> The media of interaction in information systems consist of symbols which the contributor and user mutually understand or can be brought to understand, and which can be handled by the media of communication. A documentation system can be defined as a device enabling communication with unknown persons in the indefinite future. The facts that the persons may be unknown, perhaps unborn, and that the time of consulting a given document is unknown lead to problems in the design of successful systems. (p. 197)

Kreithen, 1958:

> The field in which we are today engaged is a branch of human communications, within which there are two further subdivisions. The first such subdivision may be thought of as instantaneous communications in which the communication is between a transmitter and a receiver at a given time. . . .
> The second subdivision is that of non-instantaneous communica-

tions in which the communication between transmitter and receiver is not at one time. This is the area of storage and retrieval of information, and there may be a gap of years between the writing (transmission) and reading (receiving) of information. (p. 123)

Orr, 1959:

Documentation may be defined broadly as the science of storing and retrieving information. What relationship does communication bear to documentation? The process of communication involves a sender, transmission, and a receiver. In many forms of communication, the messages are recorded in a permanent or semipermanent form. These then require provision for storage and retrieval. In these terms it would appear that documentation is only a small part of the communication process and operates somewhere in the transmission phase. However, since it is implied in the definition of documentation that any system should be usable by human beings, the documentalist cannot ignore the sender and the receiver of the recorded information he is entrusted to handle. When these two elements are brought into consideration, documentation becomes a special phase of communication. (p. 214)

Frank, 1961:

Documentation and information work is of many kinds. It varies with the speciality and range of subject field, with the nature of the material to be exploited and according to the users for whom that material is intended. (p. 5)

. . . .

Finding pertinent information and conveying it to a potential user are a means to an end. . . . [The] very superabundance of the supply renders it a special and expert job to discover and procure from among the countless millions of publications and unpublished papers that exist somewhere in the world, those which would be the most apposite and useful for an individual's momentary needs if only he were aware of them. (p. 12)

Nor has the ultimate user of information either the time to spare or the full knowledge of possible sources which are necessary for reconnoitring in search of information on a front broad enough to cover all countries and languages, or familiarity with ways and means for causing those elements of the literature which show some prima-facie possibility of being useful to be brought to his desk, however difficult they may be to get hold of. (pp. 12-13)

It is for these reasons that a group of men and women absorbed in particular specialities can benefit from having among them a colleague, sometimes called in English an 'information officer' or 'information scientist', who is enabled by temperament and training both to share their thoughts and, knowing their daily chaning needs, to scout on their behafl over a wider sector than they themselves can cover. (p. 13)

Vickery, 1961:

> [Retrieval] is the operation by which documents are selected from the Store at the request of the User. Essentially, therefore, retrieval is concerned with the structure and operations of devices to select documentary information from a Store in response to search questions. A Store is a collection of documentary information. . . . (p. 2)
>
> The phrase 'documentary information' may mean 'information about documents' or 'information recorded in documents'. . . . In general, I too restrict the problem of Retrieval to the first type of information--the provision of the documents themselves, or the information about documents, which must then be studied by the user to ascertain the information within them. (pp. 2-3)
>
> . . . .
>
> To construct a Retrieval System, we must first of all select documents for inclusion in a Store, or we could start one stage further back and construct a device to do the selection for us. For each document, we, or the device, must then select one or more 'descriptors' by which the document can be described and discovered. We must then record descriptors, and the 'specifications' and 'addresses' of the documents to which they relate, on some physical medium, in a form suitable for searching by whatever kind of Selector we have devised. We must then provide means for transforming each User request into a set of 'descriptors', and of feeding this set into the Selector for matching against our physcially recorded full set of descriptors, to discover the 'specifications' relating to suitably close matches. We must previously have stored the documents themselves in such a manner that we (or a locating device), when provided with an 'address', can produce the document. For a fully flexible Retrieval System, we need to build in 'feedback' to the enquirer at various stages of the process, . . . (p. 4)
>
> . . . .
>
> Retrieval . . . is communication in time, . . . The information source is here a document in which information is recorded for later use. . . . But the 'source' in Retrieval is not the active, transmitting agent that it is in telecommunication. It is the 'receiver' who sends the message, a request for documents on a certain subject, and this message is not simply encoded and transmitted, it is transformed from descriptors to addresses and thence into documents, and fed back to the sender.
>
> . . . .
>
> The 'transformer' is the selector which searches the descriptor file, and the 'decoder' is the locator which searches and extracts items from the document store, the only source of new information for the 'destination'. . . . In applying information theory, we must be sure that it is in accord with our Retrieval diagram. (p. 6)
>
> . . . .

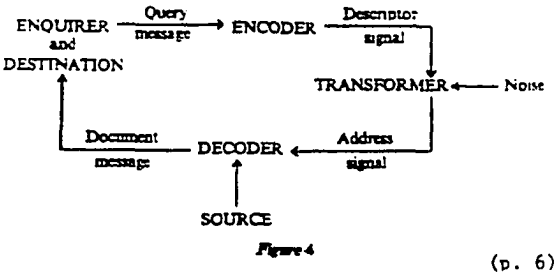


Figure 4

(p. 6)

. . . .

These, then, are the units into which I have analysed the general problem of information retrieval: the description of documents, the organization of descriptor language, document storage and location, file organization and searching, coding and mechanization. (p. 12)

Becker and Hayes, 1963:

Information storage and retrieval is . . . an integral part of the communication process, a direct outgrowth of the desire among men to communicate with one another. Knowledge has been recorded throughout the ages, and techniques and methods for storing and retrieving it have long been available.

Information is the basic ingredient of decision making. (p. 3)

. . . .

The most fundamental objective of information retrieval is to help Man make fullest use of the knowledge he discovers and records. (p. 15)

. . . .

[The Information Framework is] a convenient general structure within which to view all information storage and retrieval systems. Typical of many storage and retrieval applications, printed data are received and analyzed to determine which index terms are to be associated with the document. A user interacts with the index and the file; to use the index he must employ certain logical processes. He obtains ideas and facts from the system and eventually starts the cycle over again by generating a new document. (p. 70)

. . . .

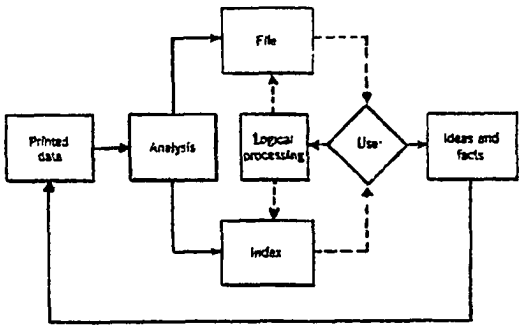


FIG. 4. The information framework.

(p. 70)

Bourne, 1963:

> The term information retrieval has long since become firmly established in common usage as the generic term that includes reference, document, and fact retrieval. Since it seems impossible to dislodge this usage, the term information retrieval is used throughout the rest of this book even though in most cases it will mean document retrieval.
> . . . .
> Reference retrieval systems are typified by the library card catalog or other indexes, which yield a complete reference to a document in response to a general search request. . . . Document retrieval systems go one step further and provide a complete copy of the document instead of just a citation or reference. Fact retrieval systems yield specific information (e.g., boiling point, tensile strength, chemical compounds) in response to a search request. Information retrieval systems are truly the most complex systems, since they must deal with concepts and abstractions, and provide specific thoughts or concepts rather than single facts or references. A true information retrieval system, for example, should be able to provide answers (not references) to a question such as "What is the difference between a point-contact transistor and a junction transistor?" . . . However, only a few information retrieval systems have yet been developed that come close to achieving this degree of performance. (p. 2)

Farradane, 1963:

> The task of recovering knowledge from those who produce it, or, more specifically, from the written records of their work, for transmission to those who need it has been widely recognized, under the name of Information Retrieval, as an urgent problem, especially in scientific and technical fields. (p. 1)

Shaw, 1963:

> The only purpose of information service, whether of the retrospective-search or the current-awareness type, is to satisfy the user's need for information under the conditions under which he is working. The cycle in each case starts with an "information requirement." (p. 606)
>
> . . . .
>
> It is manifestly difficult, if not impossible, to index and retrieve information from a document that nobody has ever seen. Hence, the first indispensable step in bibliographical control is the assembling of source material. This material must then be described in some way for identification. . . . The item must then be analyzed and classified according to subject or other pertinent content or attribute; . . . Not until these steps have been taken can a search for information begin. (pp. 606-607)

Taylor, 1963a:

> [The] information sciences are conceived as: 1) the study of the properties, structure, and transmission of specialized knowledge; and 2) the development of methods for its useful organization and dissemination. . . .
>
> At the theoretical level, the subject is concerned with the study of information, systems, and human beings as elements in the communication process, and with the interaction among these factors. It cuts across such sciences as mathematics, logic, psychology, neurophysiology, and linguistics.
>
> At the operational level, the subject, within the focus of librarians, is concerned with the development of man-machine systems for the optimum utilization of specialized knowledge, usually called information retrieval systems. It could be concerned with machine translation or any similar approach. At this level, it cuts across such technologies as electrical engineering, computer technology, management science, librarianship, and operations research.
>
> As conceived here, the information sciences are an attempt to bridge the gap between theoretical areas of the communication sciences (such as cybernetics, artificial intelligence, self-organizing systems, and automata studies) and retrieval applications. . . . We will not attempt to define information, except to say that we use it in the ordinary dictionary sense of "knowledge communicated or received concerning some fact or circumstance." Beyond this general definition we must use the word with care. (p. 4161)
>
> . . . .
>
> [The information scientist is] a person capable of observing, measuring, and describing the behavior, properties, and flow of information. (p. 4162)

Weinberg, 1963:

> The complexity of the information problem can be illustrated by considering the difference between information and documents. Usually when we speak of information retrieval we mean finding the documents which contain the information we want. But document retrieval is only part of information retrieval. The human mind is an essential link in the "information transfer chain." Information is not transferred unless what is presented to the human mind is assimilated. A pile of documents, even relevant documents, on an engineer's desk is useless unless he reads and assimilates them, . . . (pp. 18-19 in Elias, 1971)
>
> . . . .
>
> Document retrieval is a prerequisite to information retrieval--but it is only a prerequisite: an information system that stops short of transferring information from one human mind to another is inadequate.
>
> The information problem, from this point of view, naturally divides into two separate problems: how to identify, index, store, and retrieve documents, and how to transfer the contents of documents into the mind of the user.
>
> . . . .
>
> [Science] has delegated to some of its practitioners the task of compacting, interpreting, and otherwise reviewing the literature for the rest of the scientific community. The reviewer and abstractor have played, for science generally, the role that the staff in a business organization plays for management. (p. 19)
>
> . . . .
>
> The information transfer chain begins with initial generation and exposition of information: this is the business entirely of the working scientist. The later steps, such as indexing, cataloguing and retrieving are traditionally the job of the documentalist. (p. 21)

Borko and Doyle, 1964:

> Information retrieval is the total process of gathering, analyzing, indexing, filing, and making available--by dissemination or in response to specific requests--items of recorded information.
>
> An information retrieval system is an organized combination of elements, human and/or hardware, especially designed to carry out the information retrieval process.
>
> Figure 1 illustrates . . . the general structure of an information storage and retrieval system. Printed data are received and analyzed in order to determine which index terms are to be associated with the document as well as the subject category into which the document is to be classified. The analysis may also involve the translation of the document from one language to another and the preparation of an abstract. (p. 3)
>
> . . . .
>
> The physical organization is represented . . . as the file, and the reference organization(s) as the index.

. . . .

A user, requiring information, interacts with the index and/or the file. . . . Requests must be made explicit, of course, whenever the user himself is not the retrieving agent; if the librarian performs the retrieval task, for example, he or she has to be instructed verbally. (p. 4)

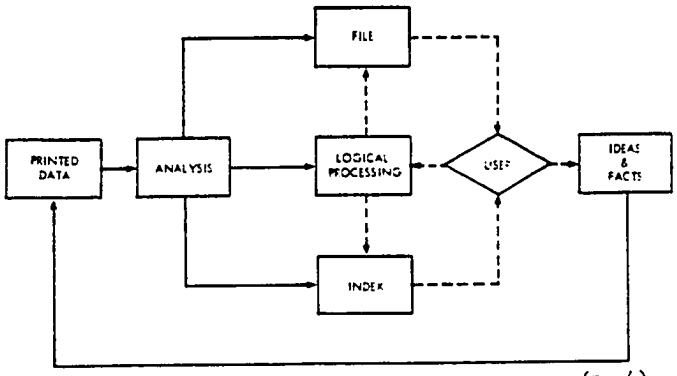


Figure 1. AN INFORMATION STORAGE & RETRIEVAL SYSTEM (p. 4)

Borko, 1965:

Information science is the theoretical discipline concerned with the applications of mathematics, system design, and other information processing concepts; it is an interdisciplinary science, involving the efforts and skills of librarians, logicians, engineers, mathematicians, and behavioral scientists. The application of information science results in an information system. The role of information science is to explicate the conceptual and methodological foundations on which existing information systems rest and to develop new concepts on which improved systems can be based. Information technology, as contrasted with information science, involves the application of tools and techniques to the operational problems of information systems.

[An] information system consists of a collection of recorded information, custodians who organize and maintain the collection, a retrieval procedure, and the users who refer to the information to satisfy a variety of needs.

. . . .

The task of information science is to re-examine existing methods of acquiring, storing, indexing, and retrieving information in the light of advanced technology and to derive new concepts and principles that can be used in the design of more efficient information storage and retrieval systems. (p. 67)

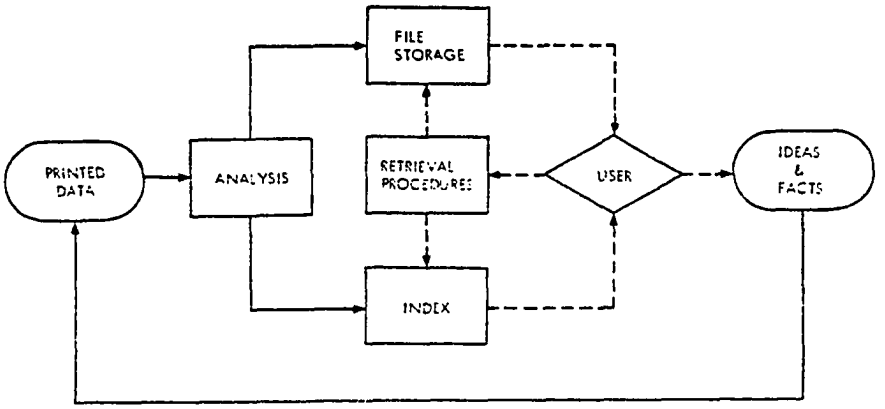


FIGURE 1. An Information Storage and Retrieval System

(p. 68)

Paisley and Parker, 1965:

> From the persepctive of communication research, information storage and retrieval systems can be thought of as receiver-controlled systems for the communication of information through space and time.
> . . . .
> In the case of receiver-controlled systems involving the selection, possible transformation, and transmission of messages previously deposited in the system, there are more constraints [than in source-controlled communication systems].
> . . . .
> Except in the rare and uninteresting special case where the receiver can examine the entire contents of the system, there must be a means by which the receiver can scan the system and select some subset of the total set of possible messages. The problems of adequately indexing or abstracting a larger file of information are many.
> . . . .
> The ultimate criterion for evaluation of receiver-controlled communication systems ought to be receiver satisfaction. (p. 23)
> . . . .
> We view an information storage and retrieval system as a link in a larger communication system connecting an original source with an ultimate receiver. Such a link becomes necessary when the amount of information in the larger system is greater than the information-processing capacity of the receiver and when, for whatever reason, it is desirable to have the ultimate receiver determine at least in part what messages he chooses to receive or in what form he chooses to receive them. (p. 24)

Sharp, 1965:

> The expression 'information retrieval' . . . is generally taken to embrace the whole field of the problem of recovering from recorded knowledge those particular pieces of information

> which may be needed at particular times for particular purposes, . . . There is, however, no recognisable or accepted body of theory, let alone practice, which can be considered as an established discipline. (p. 11)

Walston, 1965:

> Information retrieval, as the term is generally used, implies the selective recall of stored knowledge. (p. 1)
> . . . .
> . . Any consideration of information retrieval must reflect the particular requirements of the user of that information. (p. 3)
> . . . .
> Any information-retrieval system . . . must execute the same functions. The operation of the system is cyclic and these functions fall into one of two cycles: the input or storage cycle, and the output or retrieval cycle. (pp. 4-5)
> . . . .
> The input cycle is composed of the following functions:
> (1) Information collection and screening
> (2) Information conversion
> (3) Indexing
> (4) Storage
> The output cycle consists of:
> (1) Query formulation and transformation
> (2) Search
> (3) Retrieval
> (4) Data processing
> (5) Output and dissemination. (p. 5)

Lipetz, 1966:

> The field of information storage and retrieval is thus concerned with methods of creating and managing collections of records to facilitate the recovery of pertinent records as they are needed. (p. 174)
> . . . .
> Information storage and retrieval is not confined to libraries; it is commonplace in every day life. Correspondence files, accounting systems, inventory-control systems, directories--all are information storage and retrieval systems. So are collections of cooking recipes or of amateur color slides. Even the ubiquitous dictionary, as well as the index to a book or a journal, is an example of information storage and retrieval systems. All these examples are comprised of records to which one may address a variety of allowable questions (that is, questions within the intended scope of the collection) with a reasonable expectation of retrieving a selection of records in response to each question. (p. 176)
> Many seemingly different activities can be observed in information storage and retrieval systems. Operationally, however,

all such systems employ only three basic processes: the analysis of records, the derivation of new records from old ones and the physical displacement of records over a distance. (pp. 176-177)

Saracevic and Rees, 1966:

In any design or experiment in relation to retrieval systems (as in any other system) the specification of the distinction between purpose components and function components is crucial.

. . . .

With respect to the function components of retrieval systems we may distinguish as operating within each component three classes of factors:

1. System Mechanics: Instruments which are incorporated into the system during the operation of the system, e.g., manuals, computer programs, thesauri, documents, etc.
2. Human Factors: Characteristics of people who apply the system mechanics.
3. System-Human Interaction: Processes by which people apply system mechanics, e.g., acquisition, indexing, coding or searching. (p. 5)

. . . .

It is reasonable to assume that certain components and factors are common to all retrieval systems. A most useful model incorporating basic components of retrieval systems has been formulated. . . . The components relating to function and purpose are enumerated thus:

A. Purpose Components:	B. Function Components:
(1) Type of Users	(1) Acquisition
(2) Subject Discipline(s)	(2) Indexing Language
(3) File Size	(3) Coding
	(4) File Organization:
	(i) Documents
	(ii) Document Representations
	(5) Question Analysis
	(6) Searching Procedures
	(7) Dissemination

Fig 1. Purpose and Function Components of Retrieval Systems (p. 6)

Meadow, 1967:

Information retrieval is the process of recovering information-bearing symbols from their storage places in response to requests from prospective users of the information or from librarians on the users' behalf. [It] . . . is part of a complex communication system existing between the authors of information-bearing documents and their readers. We treat the book, research paper, or other document as a message to be communicated from the author to the reader, usually via one or more communications centers. (p. 3)

. . . .

> The function of an information retrieval system (which might be no more than the reference librarian at the village library) is to locate and recover information from a store. (p. 4)
>
> . . . .
>
> [To] relate the term information retrieval to general usage, we can make the following definitions and comments:
>
> Data retrieval: The retrieval of a string of symbols in response to a query.
>
> Fact retrieval: Usually the same as data retrieval, but what is a fact is, of course, highly subjective. A term to be avoided in careful discussion.
>
> Document retrieval: Frequently a two-step operation, involving retrieval of a datum or "fact" (such as a call number), then a very large symbol string, the document.
>
> Information retrieval: A term, in our usage, generic to all the above. (p. 107)
>
> . . . .
>
> Information retrieval. 1. As used by author: Search of a file of information, on the basis of criteria supplied by a searcher, and presentation, to the searcher, of information in the file that met the criteria. 2. The retrieval of documents from a file according to criteria supplied by a requestor. 3. The retrieval of specific references to documents according to search criteria supplied by a requestor. 4. Finding an answer to a question through reference to a file of information, usually using a procedure as defined in 1, 2, or 3. (p. 293)

Salton, 1968:

> Information retrieval is a field concerned with the structure, analysis, organization, storage, searching, and retrieval of information. . . . [The] use of modern computing equipment and sophisticated language processing methods appears to provide the necessary means for generating acceptable solutions [to information handling problems]. (p. v)
>
> . . . .
>
> An information dissemination system may be used to assist in and to control, to some extent, the generation, recording, analysis, classification, storage, search, and retrieval of information. Information in this context may consist of data items, such as facts or measurements, or it may consist of written texts, documents, books, summaries, abstracts, titles, and so on. The information dissemination process is best described in terms of three main components: information generation, information processing, and information utilization. . . . The first component, information generation . . . is presently not a part of any formalized system but is handled by personal communication between the parties involved. (pp. 4-5)
>
> . . . .

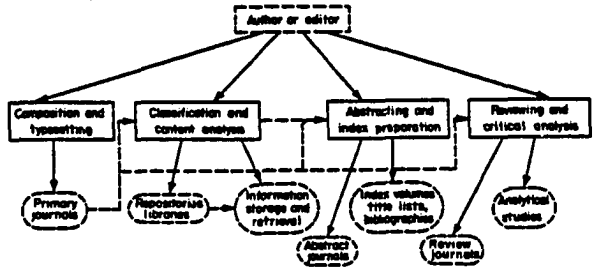


Fig. 1-1 Information generation and dissemination.

(p. 4)

Dolan, 1969:

> The information cycle begins the generation of an idea . . . and the process proceeds . . . through the full cycle where the original idea is reconfirmed, refuted, extended or modified. One of the responsibilities of an information system is to make sure that an idea, once promulgated, is retrievable. In short, to ensure "that the wheel is not re-invented". (p. 39)

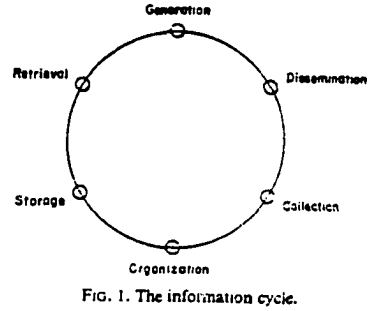


FIG. 1. The information cycle.

(p. 40)

> . . . .
> [Future] information systems would consist of three components: man, machine, and the corpus of information. (p. 40)
> . . . .
> [There] are no operational information retrieval systems in existence today. Nor are there many document retrieval systems. Most of the so-called IR [information retrieval] systems actually retrieve references and the user must then locate the document(s) which, hopefully, contains the required information. The future may see true information retrieval--semantic analysis of documents with display of relevant portions--but such systems are still on the horizaon. The emphasis to date has been in retrieving the "medium" as an intermediate step in retrieving the "message". (p. 46)

Penland, 1969:

> Information science . . . establishes indexing rules for many-to-one transformations whereby indexers may recommend reductions of information that will serve as a guide to the user in searching a file at a faster rate.

. . . .

Information science, concerned as it is with the transformation and reduction of message content for indexing purposes, compresses ordinary language in order to discover an organization of symbols and modulations within context of the thesaurus. (p. 478)

. . . .

Information science uses content analysis for its potential ability to control knowledge growth, as well as to transfer information based on retrieval strategies and indexing efficacy. Information science endeavors to organize the connotative and denotative aspects of language. (pp. 479-480)

. . . .

Communications retrieval systems provide, on demand with maximum precision, information relevant to questions posed by individuals. In this receiver initiated communication there is a one-to-many mapping in a direction opposite to that of the more familiar communications sender system. The receiver interrogates many sources, some or all of whom presumably could yield the necessary information. However, in most instances, the interrogator does not use the entire message of any one sender and he may not find his desired information in any one source but only as a product of all sources consulted. This model of communication has a considerably different pattern from that of the traditional sender-receiver model. This model is concerned with question coding when working with a patron and message coding when indexing documents in preparation for service to patrons seeking information. (p. 477)

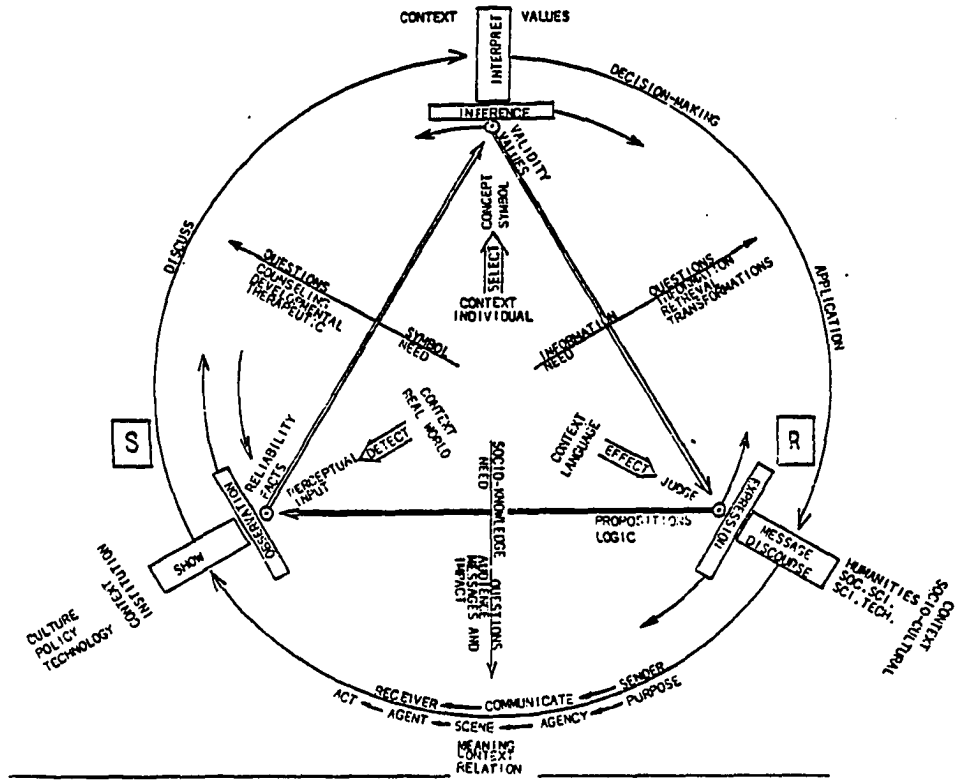
. . . .

Retrieval communication is concerned with the transfer of information as requested by an individual who interrogates documents. He wants to receive such information (selected from various senders) as will determine, or modulate, to his satisfaction some anticipated personal activity or cognitive state. (p. 479)

. . . .

In the absence of any global theory of communication the accompanying diagram . . . attempts to enumerate various components of communication, some epistemological bases and the logical relationship of propositions to question analysis and to interpersonal counseling. (p. 478)

. . . .



(p. 483)

Tou, 1969:

> Concerned with the theoretical basis of the organization, control, storage, retrieval, processing, and communication of information both by natural and artificial systems, information science is multidisciplinary in character. It covers a vast area of subject matter in the physical and biological sciences.
>
> The proliferation of information in recent years has stimulated rapid development in a field which is achieving its own identity and playing a central role in modern engineering. Inasmuch as information science is the result of a confluence of many ideas, concepts, and principles derived from various fields and disciplines, engineers and scientists specializing in one aspect of this complex, highly diversified, and rapidly growing field find it imperative to keep well-informed about the most recent developments.
>
> . . . .
>
> Engineering is rapidly becoming a diversified, multidisciplinary field of scientific endeavor. This has prompted us to regard modern engineering as a science, which has as its ingredients materials, energy, and information. (p. vii)

Vaswani, 1969:

> An information retrieval system is therefore defined here in terms of its response to a request for information. In their raw state,

requests will usually be expressed in natural language, which may not always be a suitable form for input to a mechanized system.

. . . .

It is assumed that the store contains a collection of information items, or a collection of descriptions of such items. An information retrieval system is then one which compares the specification of required items with the descriptions of the stored items and retrieves, or lists, all the items which correspond in some defined way to that specification.

. . . .

Information storage is one of man's most fundamental activities. The only reason for storing information is to make it available when required at some later point in time. Retrieval of information is therefore an equally fundamental activity, occurring whenever a fact is withdrawn from human memory and whenever we refer to a map, dictionary, telephone directory, diary, textbook, scientific report, etc. (p. 223)

Meadow, 1970:

Information retrieval is the selective recovery of information from storage. It uses criteria supplied by a requestor to discriminate between wanted and unwanted information. The information retrieved may be directly useful data, such as telephone numbers, or references to other information, such as catalog or index cards. Instead, it may be text, pictures, or records in other media which will have to be further read or scanned for the information actually desired. Some authors distinguish between systems that retrieve directly useful data and those that retrieve only records to be further scanned, the former being called data or fact retrieval systems and the latter document retrieval systems. We prefer not to make this distinction in a definition but to consider an information retrieval system to be one that retrieves symbols from a store, regardless of the form of the symbols or the purpose they are to serve. Indeed, the difference between facts and unevaluated documents may vary from user to user.

A working retrieval system needs to be concerned not only with putting information into files, but also with taking it out and changing the content of files. . . . A retrieval system, then, acquires information, stores it, maintains it, and retrieves it. In most systems a substantial amount of work in these areas is performed by human beings, even if machine supported. . . . (p. 145)

Information retrieval . . . has two major facets: (1) file processing, or the mechanics of designing, organizing, searching, and modifying files of information; and (2) language--the design of languages for document description in index records or queries, the interpretation of these languages by search and file maintenance programs, the strategy of query formulation, and the evaluation of the results of a query. (p. 146)

Vickery, 1970:

> The flow of information to the scientific and technical user can be pictured as in Figure 4.1. Information may be recorded in a publication, by which is meant any document whether public or confidential, or it may exist only in the mind or notebook of a personal source.
>
> . . . .
>
> In a general sense a store is a collection of documentary information. . . . If we define retrieval as the operation by which items are selected from a store, then not only a library catalogue, but also any index or bibliography is a retrieval device. (p. 33)
>
> . . . .

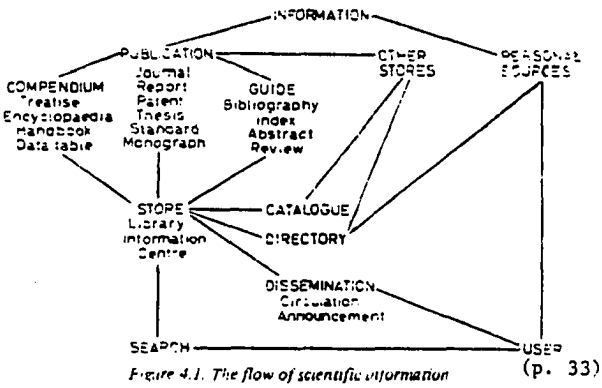


Figure 4.1. The flow of scientific information (p. 33)

> . . . .
>
> In the whole operation of information retrieval, we can recognise four phases: (a) word retrieval--in which we identify the words that will adequately describe the information sought; (b) reference retrieval--in which we identify references that are probably pertinent to the inquiry, (c) document retrieval--in which these actual documents are located, and (d) data retrieval--in which the sought information is extracted from the documents.
>
> There are many retrieval systems which handle only one phase of the total operation--e.g. a dictionary is a tool for word retrieval; . . . (p. 34)

Mitchell, 1971:

> Information retrieval is the name for the process or method by which a prospective user of information is able to convert his need for information into an actual list of citations from items in storage. It is the finding or discovery process with respect to stored information, and can be considered another, more general, name for production of a demand bibliography. Information retrieval embraces the intellectual aspects of the description of information and its specific techniques, and machines that are employed to carry out the operations. (p. 1)

Artandi, 1972:

> Other areas of information science try to probe deeper, to discover knowledge that will help to understand better the behavior of information systems. It seeks to find answers to such questions as: What is information and what is its relationship to knowledge? How is information transferred? What is the value of information and what are some of the behavioral patterns that relate to the use of information? How much information can be processed and tolerated by an individual? (p. 17)
>
> . . . .
>
> Most systems that are loosely referred to as information retrieval systems are, in fact, document retrieval systems because they do not provide direct access to the information itself. Instead, they are designed to retrieve documents which should, with some degree of certainty, contain the desired information. (p. 26)

Brandhorst and Eckert, 1972:

> Document Retrieval--the searching of a collection of documents (or document surrogates) in response to a question, and the detection of relevant documents (or references to documents) that either answer the question in themselves or that can be further scanned to determine the answer. Synonymous with "Reference Retrieval." To be distinguished from systems designed to retrieve directly useful data, i.e., data retrieval, fact retrieval, question-answering systems, and from systems for the actual physical storage, compaction, shelving, fetching, copying, or transmitting of entire documents. (pp. 379-380)
>
> Document Dissemination--the delivery of documents (or document surrogates such as references) to the information consumer. This may be in response to a specific inquiry/question/profile or it may be in response to general user interest in a given area (as in the form of an abstract journal).
>
> . . . .
>
> Retrieval is usually performed in order to disseminate. . . . . Whereas dissemination invariably follows retrieval, it can also take place independently. Document data may be captured, stored, manipulated, and promulgated en masse in the form of a secondary publication covering a period of time, without any retrieval operations per se being employed. The usual situation, however, . . is to find retrieval and dissemination closely intertwined in an information system. (p. 380)

Fairthorne, 1972:

> The function of . . . Informatics in general, is not the pursuit of knowledge as such, but of knowledge of what people have had to say. In short, Informatics is concerned with the management of messages, not with their creation or application.
>
> One key task of message management is to isolate some fragment of a text or diagram or record without compelling the reader to hunt through all of it.

. . . .

[This] is called Data Retrieval, an activity that aims to satisfy the very common requirement for a part of a text or record as opposed to a request for the whole of it. The data retrieved is the actual segment of the text or record, not what the segment may refer to. What one retrieves from a mathematical table, for instance, is not the value of a function, but an expression representing the opinion of the table maker about the value of that function. What one retrieves from an airline schedule is not as is well known, the actual times of arrival and departure but an expression representing the intentions of the air transport organization concerned. (p. 99)

. . . .

[You] cannot begin to perform even simple look-up unless you first perform ordinary Document or Record Retrieval. For you must first get hold of the appropriate documents from which the segments of text are to be extracted. But the topic of a document as a whole cannot be deduced from its textual content in isolation, it depends also upon what kind of reader is going to use it for what kind of purpose. (p. 100)

. . . .

Because a document is not a fixed unit of discourse but varies with how the records are to be used, there is not fixed level at which document retrieval ends and data retrieval begins. (p. 101)

. . . .

Data retrieval in the sense of 'look up' or 'look through' to find explicit expressions, is the necessary though not sufficient preliminary for more complex activities such as 'question answering' and 'answer inferring' from records. Before dealing with these we must bear in mind that any answer we derive from a document or recorded message is a purported answer. It may not be the correct one. Verification lies outside the scope of informatics. (p. 105)

Lancaster, 1972:

All the complex procedures of <u>information retrieval</u> are directly involved with the manipulation of classes--classes of documents of one kind or another.

. . . .

We will use this expression [information retrieval] throughout. It is the term generally use to describe activities and systems of the type discussed in this book even though the systems involved do not retrieve information (an abstraction) as such. Rather, they retrieve documents or document representations (surrogates). (p. 1)

. . . .

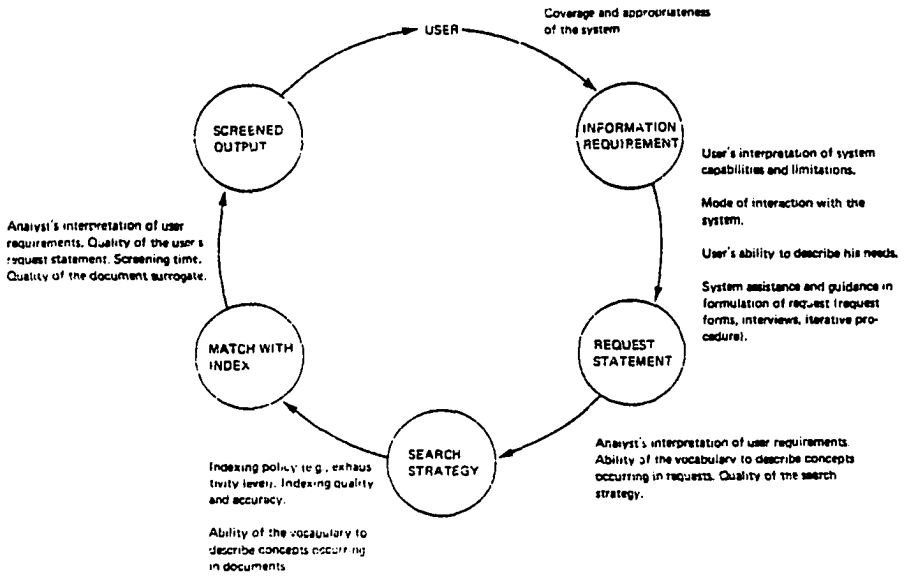


FIGURE 5 Steps in retrieval process and factors affecting success of each step. (p. 4)

Schoene, 1972:

> The terms "document retrieval" and "fact retrieval" are sometimes used broadly to distinguish between information retrieval systems that ultimately provide to the user entire documents . . . and those capable of producing a specific answer to a question. Often implicit, or even explicit, in this usage is a third group of systems, which may be labeled data retrieval systems, which handle only numerical information. If such a distinction is added, "fact retrieval" usually refers strictly to systems that retrieve specific answers from nonnumerical information. . . . However, these definitions are not sufficiently precise to be useful in discussions of feasibility and desirability of alternative systems.
>
> In the design of information retrieval systems, the question of whether a system will retrieve documents or facts is a very important design parameter, . . . (p. 247)

Goffman, 1973:

> Information science is essentially concerned with the study of the principles underlying communication processes and information systems. In general, a process is a time dependent phenomenon, i.e., a sequence of actions leading to some result. Thus, a communication process is a sequence of events resulting in the transmission of something called information from one object to another. The first object is called a source and the latter a traget or destination. The mechanism by means of which a process is realized is called a system. Systems whose function is the carrying out of communication processes are referred to as information systems.
>
> . . . .

> An information retrieval process can be thought of as an instrument for providing effective contact between the source and destination within a communication process. That is, a process which, when properly carried out, assures that the information transmitted from the source to the target is relevant, i.e., results in the accumulation of knowledge at the destination. Since processes are realized by systems, information retrieval processes are carried out by information retrieval systems. (p. 234)
>
> . . . .
>
> Since information retrieval is a communication process, information retrieval systems are concerned with identification, recognition, and transmission of information. (p. 238)
>
> . . . .
>
> An information retrieval system must provide effective contact between its information source (its file) and its users. (p. 239)

Meadow, 1973:

> I believe that information science is a social or behavioral science since so much of it is concerned with human communication, particularly the design of languages for entering data into a computer, asking questions of the data, or evaluating the results of retrieval. (p. viii)
>
> . . . .
>
> In recognition that the semantic problem exists, we find that such terms as document retrieval, fact retrieval, data retrieval, and information recovery are variously used to describe retrieval of books in answer to a question (document retrieval) or retrieval of the information sought, directly (the latter three terms). In the definition we shall use, information retrieval means the retrieval of information-bearing symbols from a file, and is independent of the nature or form of the information retrieved or the use to be made of it. (p. 120)
>
> . . . .
>
> The principal difference between a switching center and an information retrieval system, viewed as a communication system, is that in a retrieval system, the author, or message originator, does not determine the ultimate addressee. At best, he writes to a class of potential readers whose interest and extent of knowledge he must presume. . . . Thus an additional step is introduced into the communication process, that of the potential recipient defining his own "address" in terms of the attributes of documents he wishes to receive. (p. 121)

Sparck Jones and Kay, 1973:

> "Information science" may be interpreted very broadly as having to do with storage, retrieval, and transmission of information of any kind, in any way. It is thus concerned with a primary human activity. . . . . But since language is such a major vehicle for the transfer of information, information science may be regarded as chiefly concerned with linguistically encoded information.

> Within the field of information science, thus interpreted, effort has been mainly devoted to information retrieval . . . [namely:] the problems that arise in characterizing the content of documents and information requests in such a way that the characterizations can be used in an automatic process which can assess the relevance of the document to the request. (p. 2)
> . . . .
> We said at the outset, that we would regard the phrase "document retrieval" as synonymous with "information retrieval." (p. 174)
> . . . .
> The document retrieval system responds to a user's request for information, not by supplying the desired information itself, but by providing documents, or the descriptions of documents, in which there is some hope of finding the information. A fact retrieval system, on the other hand, aims to answer questions directly. For this reason, such systems are also frequently referred to as question-answering systems. The difference is not one of principle because, clearly, a document retrieval system is nothing more than a fact retrieval system restricted to operate on facts about documents. The main difference between the two types of retrieval comes from the fact that a useful fact retrieval system cannot rely on finding a ready-made answer to more than a very small proportion of the requests it receives in the file of data available to it. Instead, it must be capable of finding facts in that file on the basis of which to infer a correct answer to the question. (p. 175)

Watson et al, 1973:

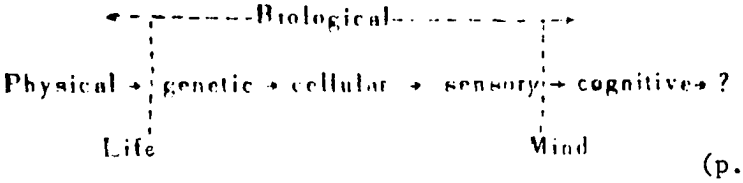
> [We] are not challenging the notion that there exist specialized skills in the creation of information retrieval systems, but we do challenge the notion that these skills can be segregated and exercised independently of skills in the subject field they serve. Indeed, we are equally suspicious of leaving the structuring of documents to any closed group of "experts" from within the discipline. The development of information services should be an active and on-going partnership between those who possess the skills of information science and those who understand the discipline within which the documents are written. (p. 273)

Wilson, 1973:

> The word 'documentation' has had a long and confused history. In English the word originally meant, in legal terminology, 'the provision of evidence'. This meaning may be developed, as it has been by some, to cover the provision of all kinds of information to those who need it. Had this understanding of the word been retained it seems likely that the debate which has engaged the energies of writers over many years and which, in the last analysis, has been sterile, would not have taken place. (p. 1)

Brookes, 1974:

> At present information science as practised concerns itself with the domain of documentary scientific and technical information. A typical information system collects the documentary sources of information relevant to its interests, identifies, abstracts and indexes the items it selects, and then organises this bibliographic information, by computer or otherwise, in many kinds of different ways to simplify the problems of retrieval for many kinds of users. Thus we are professionally concerned with the relation between information and knowledge.
>
> The term knowledge is commonly understood to apply to a summation of items of information which have been integrated to form an organised coherent structure. . . . [It] is applied to the cumulated, organised body of information that any human can hope to acquire by learning.
>
> If we try to express this relationship between information and knowledge in a symbolic way, we might write it thus:-
>
> I = (S) (S+ S) ...
>
> In this fundamental equation, I is an increment of information which, when 'added to' the 'knowledge structure' (S), modifies that structure to become (S+ S). (p. 116)
>
> . . . .
>
> I suggest that the interpretation of the fundamental equation [describing the fundamental information process] is the basic research task of information science. . . .
>
> . . . .
>
> So, instead of the Shannon sequences of functional devices, ie a source or generator of signals, an encoder and a transmitter in the sender and a detector, decoder and recorder in the receiver, I substitute a hierarchy of levels--the physical, the biological and the cognitive.
>
> [C] → [B] → [P] → [P] → [B] → [C]
>
> (p. 117)
>
> . . . .
>
> It is better that we recognise that our fellow scientists who are studying information systems in which the transmissions are not documentary or cognitive, but biochemical or neural, are working at our side rather than in wholly separate fields.
>
> In fact I regard those levels I specified earlier not as sharply distinguishable fields with firm exclusive boundaries but more as a continusous spectrum of information processes.



(p. 119)

. . . .
[Even] primitive unicellular organisms were able to process information. Their 'thoughts' were restricted to the recurrent question: Is this particle which has just touched me edible or not?--the basic Shannon information system limited to two possible discrete signals. (p. 120)

Kochen, 1974:

Information retrieval, aside from its how-to-find-out interpretation, is a fascinating challenge to science. How do people or animals store and retrieve information. What are the biochemical, physiological, and psychological mechanisms of this mysterious phenomenon. At the larger level of entire intellectual communities, what principles govern the growth of knowledge? (p. xiii)
. . . .
When an information technologist speaks of an information retrieval (IR) system, he usually means a way of providing people with documents they need. (p. 1)
. . . .
When a psychologist or biochemist speaks of information retrieval . . . he usually refers to the process of selecting and extracting from an organized collection of stimulus-response associates a more-or-less specified one. (pp. 1-2)
. . . .
The notion of information, which is the central concept, is still as unclear as it is pervasive. It is used in the discussion of genetic codes and in the transmission of culture. It appears in economics and influences psychology. It seems impossible to discuss either computers, brains, or libraries without using this notion. Yet only in communications engineering does it have a well-explicated meaning.
The primary task of an IR systems theory is to clarify the meaning of <u>information</u> in information retrieval. . . . We need new ways of thinking about how information can be represented and recorded for later use. (p. 2)
. . . .
The point of view which has shaped this book is that of an inquiring system (Churchman, 1971). It stresses concern primarily with the question: how can a decision-maker utilize existing wisdom for more effective real-world problem-solving.? (p. 7)
. . . .
The IR system is not merely a collection of machines, programs, and operating protocols. Like its host institution, it is a living system, including its human users, servers, and monitors.
. . . .
The key problems for which IR systems ought to be created . . . were recognized at least 40 years ago as somehow screening the billions of words of recorded knowledge, deciding which of these articles and books to study more intensively, and utilizing such knowledge, understanding, and wisdom as may be arrived at this way. . . . (p. 8)
. . . .

> Our two primary objects of analyses are (a) an IR system and (b) system of knowledge and communication in which it functions. We will, for the most part, think of the knowledge system concretely as that by which people with problems use, and add to, the literature. On dissecting this knowledge system, we find three major ingredients: people, documents, and topics. People generate, digest, and utilize information. Documents record and trasnfer it. Topics organize it. (p. 11)
> . . . .
> Only documented, authenticated knowledge is demanded and supplied. (p. 12)

Summit and Firschein, 1974:

> [Document retrieval:] A system capable of retrieving information relating to documents, usually a representation or surrogate of a document (e.g., title or abstract) in response to a question, and the detection of relevant or near-relevant documents (or references to documents) that either answer the question in themselves or that can be further scanned to determine the answer.
> Furthermore, the words "document retrieval," "reference retrieval," and "information retrieval" will be used interchangeably, as is generally the case in the literature. (p. 287)

Swanson, 1974:

> How might one begin to think about information retrieval and its principles? My own preference is to consider, as a reasonable point of beginning, the problem of selecting, from a collection of documents, one or more which is expected to be useful. . . . Clearly any retrieval problem, as such, emerges and takes shape only if the size of the collection is so large that it must be organized for partial search, or equivalently that a selection must first be made by someone, or some system, other than the user himself. . . . The nature of the problem is then this: the requester must somehow describe to the system the attributes of the documents which he wishes to inspect, and the system in turn must be able to identify and search these attributes. (p. ix, Foreward, in Kochen, 1974)

Bohnert, 1975:

> [Information] retrieval is demarcated from all other types of communication by the requirement that the receiver not the sender determine both the kinds of messages to be received and the time and place of the reception of messages. Unlike telephone conversations and personal correspondence that are initiated by an individual wishing to communicate a particular message to a particular person, retrieval communication must wait for the receiver to initiate a request to receive a message.
> . . . .

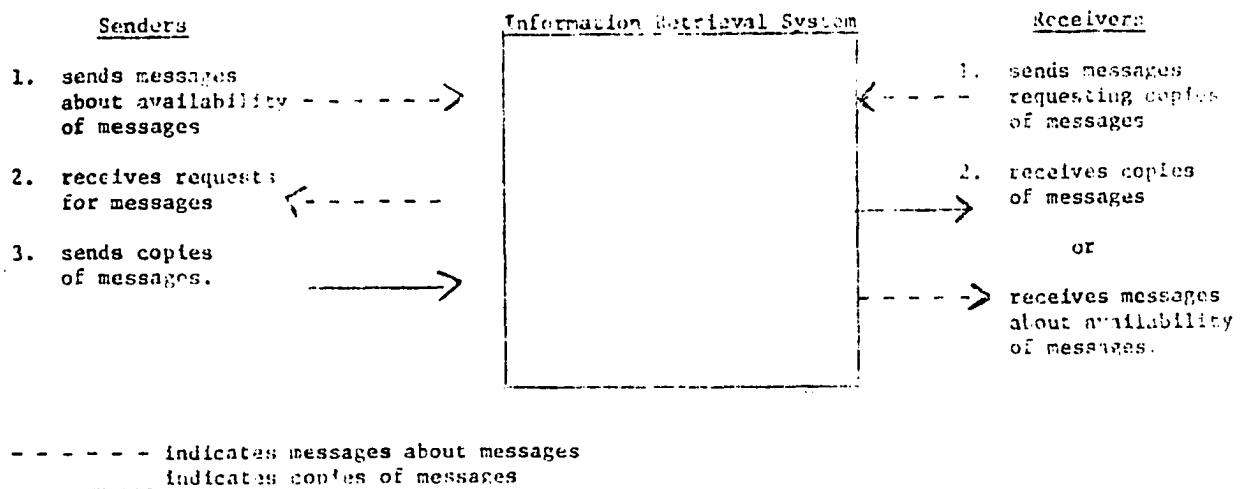
Intermediaries in retrieval systems must intercede in behalf of the requesters. First they must predict and then secure copies, or ready access to copies, of the messages most likely to be requested sooner or later. Upon request, they must select from the stored messages those most appropriate to a request, if any appropriate messages can be identified, and then they must provide copies of the identified messages to the requester, if any copies are available.

. . . .

Now the definition is complete and a model of it can be presented. Henceforth, it would be more useful to start discussions of the definition of information retrieval or information science from this model than from the much more general model of communication of Claude Shannon. (p. 7)

. . . .

Figure 1. A MODEL OF INFORMATION RETRIEVAL COMMUNICATION.



(p. 8)

Doyle, 1975:

"Processing" can be thought of as a family of operations, each of which acts uniformly on every item of information presented, and includes the idea of having the items in a place available and in a form available for ultimate use. "Retrieval," also in a broad sense, suggests all processes that are selective in nature; this--the case can be made--would even include the process of reading, for the mind is very selective indeed in extracting information from the printed page. (p. 16)

. . . .

What makes up an information system depends on what information is and what a system is. In classic information theory terms, information is comprised of symbols which, when broadcast by some sender, have the capability to reduce the uncertainty in the mind of some listener. Of chief interest to students of information retrieval is that information may be preserved as well as communicated. This can function as the basis of a distinction between an information

system and a communication system. A mere communication system need provide only for the transmission of information (and not necessarily two-way transmission). It appears to be the custom, however, to require an information system to deal with both the preservation and transmission aspects of information, and we subscribe to that notion.

. . . .

Figure 7.1 is a highly generalized diagram of an information system . . . conceived of as a front half (input) and a back half (output). Information units flow from left to right in the diagram (solid arrows), and these units, previously referred to as messages, are more aptly called documents when they are to be retained in store for potential future recipients, who, in their turn, are more commonly referred to as users of documents. (p. 190)

. . . .

It is at the analysis phase . . . that the characterization and organization of all information items is decided upon. . . . Documents themselves are placed in a file, . . . (p. 191)

. . . .

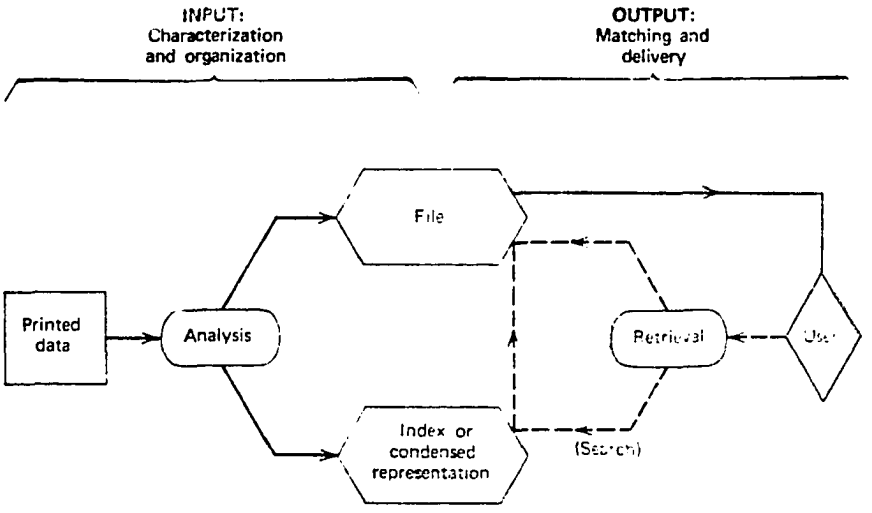


Figure 7.1. The information framework.

(p. 191)

Peters, 1975:

Documentation. (1) The systematic collection, classification, recording, storage, and dissemination of specialized information, generally of a technical or scientific nature. (2) Written description of a computerized system's operating programs and facilities. (p. 54)

. . . .

Information processing. All technical and commerical operations performed by computers. Normally used in a more general sense than the term data processing.

. . . .

Information storage and retrieval (ISR). The process of retrieving documents from a storage place in response to a person's query; this may be a manual operation (e.g., a librarian taking a book off of a shelf in the library) or a machine operation involving a computer, a data base, or other automated records. (p. 85)

Bookstein and Cooper, 1976:

> Information retrieval systems (by which will be understood here reference and document retrieval systems as opposed to data retrieval systems) have frequently been compared to communication systems in which an author communicates with a patron of a system by means of a document. The patron, perhaps anticipating the retrieval mechanisms of the system, translates a felt need for information into a verbal request which he brings to the system; by means of the request, perhaps further transformed, and a processed version of the document collection (the "document surrogates" or "index records"), the system predicts the extent to which each document is "relevant" to the user, that is, would be judged by the user to be an appropriate response to his request. The system then acts as a switching mechanism, connecting its patrons to those documents likely to be of interest to them. (p. 153)
>
> . . . .
>
> The partitioning of the collection, permitting a search that is more efficient than a random search of the collection, is the fundamental service provided by the system for its users. (p. 154)

Langefors, 1976:

> To be supplied with useful information to improve our knowledge, we use information systems. The system information is represented by recorded or transmitted "physical" symbols, which we call "data". . . . To retrieve the right data, the user could be requested to specify what information he wants retrieved.
>
> . . . .
>
> In information systems we use <u>symbols</u>, which, through their association with reality, provide information. We take data to mean <u>physical</u> symbols that can be recorded or transmitted or processed. (p. 642)
>
> . . . .
>
> <u>Information</u> may be defined as knowledge, especially as it provides people (or machines) with <u>new</u> facts about the real world. <u>Data</u> may be defined as physical symbols used to represent information for storage, communication, or processing. (p. 641)

Mikhailov, Chernyi, and Gilyarevskij, 1976:

> Scientific information work is an institutionalised variety of research work conducted in order to enhance the efficiency of research and development proper and consisting in the gathering,

analytical and synthetic processing, storage and retrieval of scientific information recorded in documents and in supplying this information to researchers and other specialists at the right time and in a convenient form. (pp. 240-241 in their Scientific Communications and Informatics (Moscow: Nauka, 1976), quoted by Kazantseva and Ursul, 1977, p. 3)

Salton, 1976:

Information retrieval (IR) is concerned with the structure, analysis, organization, storage, searching, and dissemination of information. An information retrieval system operates on the one hand with a stored collection of information, and on the other with a user population desiring to obtain access to the stored items. An IR system is thus designed to extract from the files those items that most nearly correspond to existing user needs as reflected in requests submitted by the user population. A library storing books and serving a population of customers is then, among other things, an example of an information retrieval system.

. . . .

Conceptually, it is possible to reduce the operations of a typical information retrieval system to the following two main types: information analysis, normally consisting of the assignment to each stored item and to each search request of indicators designed to reflect the information content of the given item; and information organization and file search concerned with the manner in which the stored information is organized in the file and with the corresponding search procedures. (p. 649)

. . . .

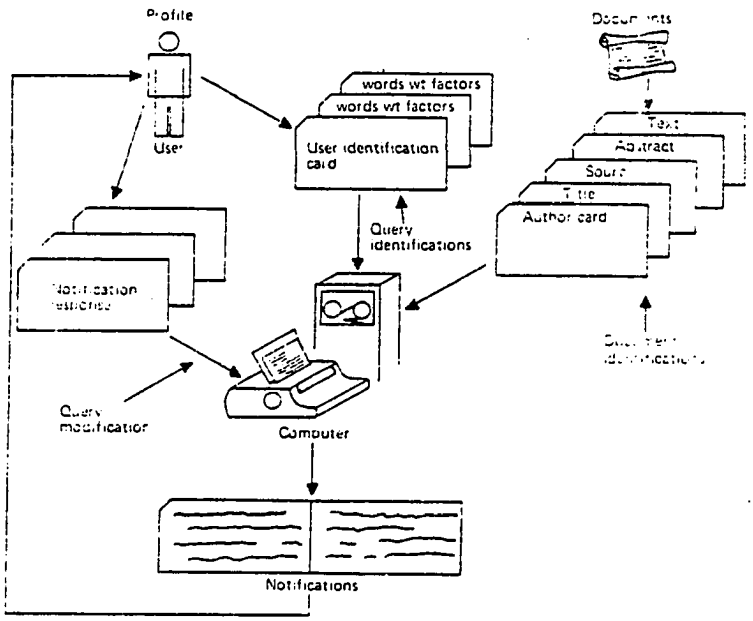


Fig. 3. Elements of retrieval system with provision for user feedback. (p. 653)

Teichroew, 1976:

> An information system can be defined as a collection of people, procedures, and equipment designed, built, operated, and maintained to collect, record, process, store, retrieve, and display information. (p. 657)
>
> . . . .
>
> Information systems . . . accept (as inputs), store (in files or a data base), and display (as outputs) strings of symbols that are grouped in various ways (digits, alphabetical characters, special symbols). Users of the information systems attribute some value or meaning to the string of symbols. Sometimes a distinction is made between the mechanistic representation of the symbols, which is called "data," and the meaning attribute to the symbols, which is called "information." A given output datum, under this definition, can result in different information to different users. . . . The term "Information Processing System" (IPS) is perhaps more appropriate. It will be considered synonymous with "data processing system." (pp. 657-658)
>
> . . . .
>
> Information storage and retrieval systems [are] designed to store data (or documents) and retrieve it in response to queries. (p. 658)
>
> . . . .

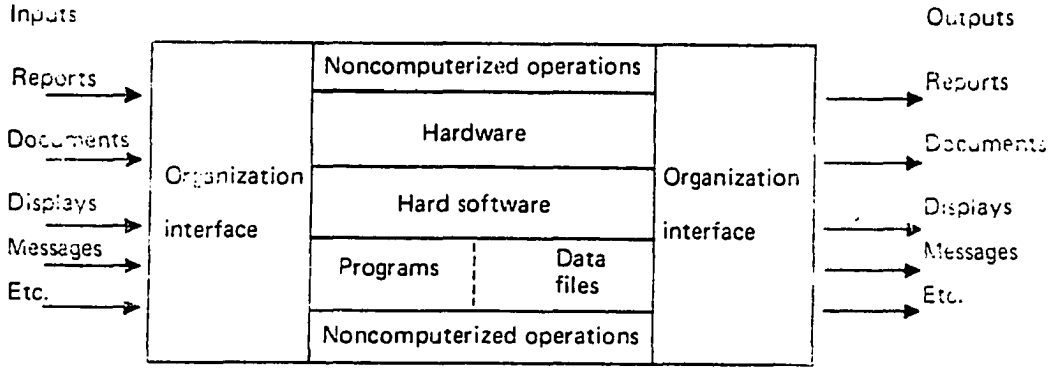


Fig. 1. Diagram of an information system.

(p. 658)

Brittain, 1977:

> The information scientist is concerned primarily with the relationship between the content of documents and the work tasks of users, including problem-solving. (p. 36)
>
> . . . .
>
> The objective of the information scientist must be to retrieve and supply information that is geared to problem-solving, work tasks and the predetermined goals and objectives of the institutions in which users work. (p. 37)
>
> . . . .

> If an information specialist is concerned with problem-solving and work tasks of users his interactions with users take on new dimensions. The information scientist continues to seek details of the problem, task, or decision in hand. (p. 38)
>
> . . . .
>
> [Information science] has to do with the relationship between documents as measured by the reactions of users, or indirectly, by citations; the contents of documents; and the value of information in science, technology, research, and problem-solving. (p. 40)

Lancaster, 1977:

> The term information retrieval, as it is commonly used, refers to the activities involved in searching a body of literature in order to find items (i.e., documents of one kind or another) that deal with a particular subject area. An information retrieval system, then, is any tool or device that organizes a body of literature in such a way that it can be searched conveniently. Most information retrieval systems do not store and search documents themselves. Rather, they store some representation or surrogate of each document: a bibliographic citation (with perhaps an abstract) together with one or more indicators of subject content. (p. 5)

Heaps, 1978:

> Although recorded information usually is retrieved by means of stored data that represents documents, it is the emphasis on information relevant to a request, rather than direct specification of a document, that characterizes the modern subject of information retrieval. In addition to being concerned with the practical aspects of the design of operational computerized retrieval systems the subject of information retrieval includes aspects of the theory of measurement and definition, and of information content and relevance. (p. 4)
>
> . . . .
>
> A study of information retrieval is necessarily concerned with optimization since it is desired to retrieve relevant items in the shortest possible time, or with minimum expense, or with maximum efficiency in regard to some estimate of relevance. (p. 6)
>
> . . . .
>
> The subject of information retrieval is thus developing through application of matrix notation, probability theory, optimization techniques, pattern recognition, and systems analysis through which operations are represented by mathematical models that may be programmed on a computer. (p. 7)

Lancaster, 1979:

> As it is most commonly used, the term information retrieval is really synonymous with literature searching. Information retrieval is the process of searching some collection of

> documents, using the term document in its widest sense, in order to identify those documents which deal with a particular subject. Any system that is designed to facilitate this literature searching activity may legitimately be called an information retrieval system. The subject catalog of a library is one type. So is a printed subject index. (p. 11)

Maron, 1978:

> [The] larger field of information retrieval divides into document retrieval (also called "reference" or "citation" retrieval) and data retrieval (also called "question-answering"). (p. 7)
> . . . .
> [The] purpose of a document retrieval system is to accept subject (topic) requests in some appropriate form and to search for and select from a large corpus of stored documents all and only the relevant ones (or citations to those documents). (p. 5)
> . . . .
> The current state of theory and foundations in the field of information retrieval is undergoing important growth and development. And one day soon we shall have sophisticated theories (and techniques) of information retrieval applied to advanced technology in order to produce very effective systems for obtaining access to recorded information. (p. 9)

Saracevic, 1979:

> Information science was a visible recognition [in the 1960s] of that notion...that indeed there is a possibility to create a scientific dimension to all that transpires in and even more so around information retrieval. (p. 10)

7.3. Definitions about Objects and People: To transfer

Weitenkampf, 1908:

> The documentary method draws from . . . documents the facts necessary for study and research, thus truly offering to the student the collaboration of all who have previously worked over the same question. . . . Documentation, therefore, is the systematically organized intermediary between the public and the documents. (p. 403)
> . . . .
> The work of documentation would thus have for its object the analysis and summarizing of the documents, the co-ordination and codification of their contents.
> . . . .

> [Universal] documentation would truly become in its collections and its different repertories, a vast intellectual mechanism destined to class and condense scattered and diffused knowledge, and to distribute it wherever needed. (p. 404)

Bradford, 1939:

> Documentation is defined as the collection, classification and distribution of documents. It proceeds from the need to put in order the processes of acquiring, preserving, abstracting and supplying as required, books, articles, reports, data and documents of all kinds. Documentation is the result of the realisation of the gap between the making of a record in any sphere of work and the placing of that record in the hands of the individual who can use it as the basis of new achievement. (quoted in American Documentation 1(January, 1950): 26)

Ranganathan, 1947:

> Documentation is a mode of featuring in a list of entries the work done in the entire field of Knowledge. One quality of documentation should be that it brings all relevant materials to the notice of any worker, . . . (p. 2 in FID publication no. 227, 1948)

Smith, 1949:

> Documentation's two primary purposes are to facilitate prompt dissemination of live facts among interested persons, and to systematize dead storage for ready resurrection of any wanted fact. . . . Given the necessary funds and personnel, the huge bulk of scientific and technical literature could be placed under effective bibliographic control. . . . (p. 162 in American Documentation 1(August, 1950)

Taube, 1952:

> Documenation as the designation of the total complex of activities involved in the communication of specialized information includes the activities which constitute special librarianship plus the prior activities of preparing and reproducing materials and the subsequent activity of distribution. In essence documentation is an amalgam of librarianship and publishing with the added responsibility of preparing or causing to be prepared the materials to be published, collected, organized, serviced, and disseminated. This last element is the weak spot of our definition. There are those who would leave out the actual initial preparation of materials although it is recognized that documentation does include the preparation of bibliographical and reference material, i.e. the so-called "secondary publications." To the extent that responsibility for preparing primary materials is corporate rather

than individual and to the extent that the initial preparation is guided and determined by the ultimate purpose of distribution to a special audience, I think that preparation of the document is a part of documentation. (p. 166)

Mikolajski, 1955:

Scientific and technical documentation is a complex of the following activities: collecting documents from a defined field of knowledge, acquaintance with, and apresentation of, their contents, dissemination of information on the contents of documents among those connected with a domain of knowledge or industry, in order to facilitate work and accelerate the development of such field. (quoted by Dembowska, 1968, p. 15)

Perry, Kent, and Berry, 1955:

[A] fundamental difference in modus operandi distinguishes communication involving direct transmission of a message from sender to receiver . . . from communication involving use of a file or library of graphic records.

. . . .

In this [latter] form of communication the receiver must play a dynamic role. A collection of graphic records remains inert until the user takes the initiative. . . . Until the receiver approaches the record collection, it functions as a reservoir for receiving and accumulating incoming messages.

. . . .

The virtual necessity for the user to make purposeful selections when using collections of records means that much time and effort may be conserved by processing such records in anticipation of future use. (p. 246)

. . . .

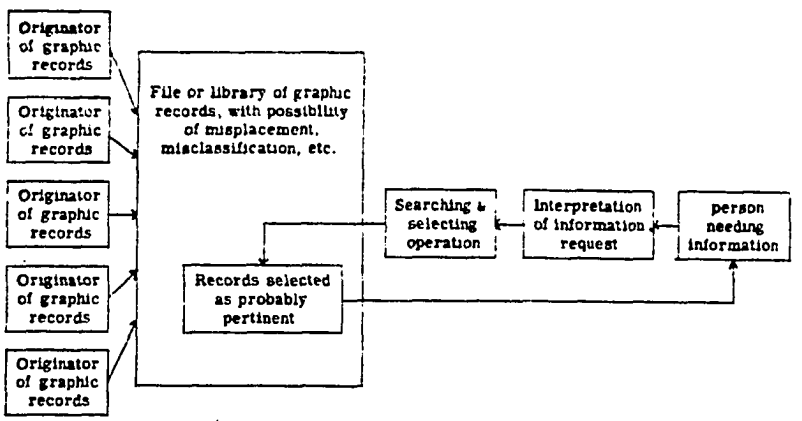


Figure II

Diagram of Communication Through a Collection of Graphic Records (p. 247)

Shaw, 1957:

> Documentation is the identification, recording, organization, storage, recall, conversion into more useful forms, synthesis and dissemination of the intellectual content of print and other recorded materials, in relationship to the specialized needs of particular users and uses. (p. 15)

Bernier, 1958:

> I consider that information storage and retrieval systems are made up of three components:
> 1. The contributors to the system,
> 2. The media of communication (which in documentation systems consist of a storage element and selectors),
> 3. The users of the system.
> I consider that "environment" includes all three components. (p. 190)
> . . . .
> The media of interaction in information systems consist of symbols which the contributor and user mutually understand or can be brought to understand, and which can be handled by the media of communication. A documentation system can be defined as a device enabling communication with unknown persons in the indefinite future. The facts that the persons may be unknown, perhaps unborn, and that the time of consulting a given document is unknown lead to problems in the design of successful systems. (p. 197)

Crane and Bernier, 1958:

> The documentary systems considered here can be defined as devices for communicating with unknown persons in the indefinite future. The recipients of the information may be unborn when a document is prepared. The specific information that the unknown recipients will select is also unknown. In current idiom, documentary systems are characterized by lack of feedback. (p. 1050)
> . . . .
> Documentation systems can be considered to be made up of three components: (1) the contributors, (2) the storage element (including selectors), and (3) the users. It is only by interaction among the components that the systems become useful. Because of the delayed nature of the communication involved, there is a minimum of interaction between contributors and users. The interaction is largely confined to that between the storage element and the contributors or the users. (p. 1051)

Becker and Hayes, 1963:

> Information storage and retrieval is . . . an integral part of the communication process, a direct outgrowth of the desire among men to communicate with one another. Knowledge has been recorded throughout the ages, and techniques and methods for storing and

retrieving it have long been available.

Information is the basic ingredient of decision making. (p. 3)

. . . .

The most fundamental objective of information retrieval is to help Man make fullest use of the knowledge he discovers and records. (p. 15)

Farradane, 1963:

The task of recovering knowledge from those who produce it, or, more specifically, from the written records of their work, for transmission to those who need it has been widely recognized, under the name of Information Retrieval, as an urgent problem, especially in scientific and technical fields. (p. 1)

Heilprin, 1963:

[Information] science concerns stored information; i.e., the modulation-stimuli for sensing the information are characteristically converted from short to long duration. (p. 241)

. . . .

[Information science is:] the science which concerns transmission of meaning through systematic or intentional production of direct sense impressions (or their machine equivalents) the stimuli for which are characteristically but not exclusively of long duration. (p. 240)

. . . .

[Anything] we sense is a partly modulated carrier. But there are only two basic kinds of modulation. In the first (e.g. human speech; radio broadcast) the modulation varies in time. To sense the "marks" on the carrier the modulation must die out fast enough so that the sensor is free to discriminate the next oncoming signals. For example, human speech drawn out by reverberation becomes indistinct. Therefore such signals are of short duration (SD). . . . [All] information transfer requires SD modulation. . . .

In the second mode the modulation varies in space. The carrier is a solid. Spatial modulation . . . is the only kind of message having long duration (LD). The message may endure for centuries. Discovery of this property of marks on a solid enabled man to create civilization. . . .

Since information cannot be "read out" except in the SD mode, the two modes must be interconvertible.

. . . .

Since the SD mode is universal in information transfer it is not a distinguishing feature of intentional, meaningful messages. On the other hand the characteristic which distinguishes IS is storage--extending the life of the stimulus-modulation. IS deals primarily with those sciences, technologies and arts which exploit LD messages. (p. 240)

Mikhailov, 1963, and Mihailov and Polushkin, 1963:

> [The object of scientific information work] is the selection, elaboration and communication of necessary scientific information to a team of scientists working on a defined problem. In scientific information processes, the following stages may be distinguished: 1) Collection of scientific documents; 2) Analytical-synthetic presentation of documentary information (i.e. of documents); 3) Storage and retrieval of information; 4) Reproduction and distribution of informational materials. . . .
>
> In order to prepare rules for the most rational possible organization of documenta ion and information activity and the use in this domain of modern technical media, it is necessary to investigate the regularities appearing in processes of communicating scientific information.
>
> The need to reveal these regularities was the reason for the creation of a new research discipline--theory of scientific information. The subject of this branch of science is documentation and information activity--that is, the complex of processes connected with communicating scientific information and particular processes which compose that activity, documentation and information activity being here understood not only as a form of relations inside science itself, but also as a form of interrelations of science with production and with other fields of human activity. . . . .
>
> The theory of scientific information is also concerned with the physical forms of communicating information--that is, above all with verbal documents. Therefore, the creation of the most rational forms and methods of recording the results of scientific knowledge is one of [the] essential tasks of this new discipline. (quoted by Dembowska, 1968, pp. 108-110)

Taylor, 1963a:

> [The] information sciences are conceived as: 1) the study of the properties, structure, and transmission of specialized knowledge; and 2) the development of methods for its useful organization and dissemination. . . .
>
> At the theoretical level, the subject is concerned with the study of information, systems, and human beings as elements in the communication process, and with the interaction among these factors. It cuts across such sciences as mathematics, logic, psychology, neurophysiology, and linguistics.
>
> At the operational level, the subject, within the focus of librarians, is concerned with the development of man-machine systems for the optimum utilization of specialized knowledge, usually called information retrieval systems. It could be concerned with machine translation or any similar approach. At this level, it cuts across such technologies as electrical engineering, computer technology, management science, librarianship, and operations research.
>
> As conceived here, the information sciences are an attempt to bridge the gap between theoretical areas of the communication

sciences (such as cybernetics, artificial intelligence, self-organizing systems, and automata studies) and retrieval applications.(p. 4161)

Weinberg, 1963:

> The complexity of the information problem can be illustrated by considering the difference between information and documents. Usually when we speak of information retrieval we mean finding the documents which contain the information we want. But document retrieval is only part of information retrieval. The human mind is an essential link in the "information transfer chain." Information is not transferred unless what is presented to the human mind is assimilated. A pile of documents, even relevant documents,on an engineer's desk is useless unless he reads and assimilates them, . . . (pp. 18-19) in Elias, 1971)
>
> . . . .
>
> Document retrieval is a prerequisite to information retrieval--but it is only a prerequisite: an information system that stops short of transferring information from one human mind to another is inadequate.
>
> The information problem, from this point of view, naturally divides into two separate problems: how to identify, index, store, and retrieve documents, and how to transfer the contents of documents into the mind of the user.
>
> . . . .
>
> [Science] has delegated to some of its practitioners the task of compacting, interpreting, and otherwise reviewing the literature for the rest of the scientific community. The reviewer and abstractor have played, for science generally, the role that the staff in a business organization plays for management. (p. 19)
>
> . . . .
>
> The information transfer chain begins with initial generation and exposition of information: this is the business entirely of the working scientist. The later steps, such as indexing, cataloguing and retrieving are traditionally the job of the documentalist. (p. 21)

Heilprin and Goodman, 1965:

> Both information storage and retrieval (ISR) and education (E) deal with the communication of ideas--messages. The messages which E conveys are of two kinds--informative or cognitive, and controlling or training. This analogy is mainly to the cognitive aspect: messages which convey information. (p. 13)
>
> . . . .
>
> All messages may be divided into two classes: those of short duration (SD) and those of long duration (LD). (p. 13)
>
> . . . .
>
> The reason why SD messages are more basic than LD is simply that when the message passes into the sensor of man or machine

> it must do so in SD form. Human sensory (afferent) and motor (efferent) messages travel by time-varying modulation to and from their destination or source--usually the brain. The same is true of machines which pass information through a sensor into some "decision" mechanism.
> . . . .
>
> Because of this constraint on communication--that a message must enter the sensor in the SD model--all "stored" or LD messages must be convertible to SD form. . . . It is also true that many SD messages are convertible to LD mode, but this was not always so--and the conversion is man's peculiar discovery. He found that information in LD mode can be stored, i.e. propagated into the time dimesnion, even beyond the life of the message sender. The discovery enabled the cumulation of knowledge--the possibility for man's finite brain to tap a much larger memory than his own. Using this technique of storage as a tool, he erected science and civilization. (p. 15)

Paisley and Parker, 1965:

> From the perspective of communication research, information storage and retrieval systems can be thought of as receiver-controlled systems for the communication of information through space and time.
> . . . .
> In the case of receiver-controlled systems involving the selection, possible transformation, and transmission of messages previously deposited in the system, there are more constraints [than in source-controlled communication systems].
> . . . .
> Except in the rare and uninteresting special case where the receiver can examine the entire contents of the system, there must be a means by which the receiver can scan the system and select some subset of the total set of possible messages. The problems of adequately indexing or abstracting a larger file of information are many.
> . . . .
> The ultimate criterion for evaluation of receiver-controlled communication systems ought to be receiver satisfaction. (p 23)
> . . . .
>
> We view an information storage and retrieval system as a link in a larger communication system connecting an original source with an ultimate receiver. Such a link becomes necessary when the amount of information in the larger system is greater than the information-processing capacity of the receiver and when, for whatever reason, it is desirable to have the ultimate receiver determine at least in part what messages he chooses to receive or in what form he chooses to receive them. (p. 24)

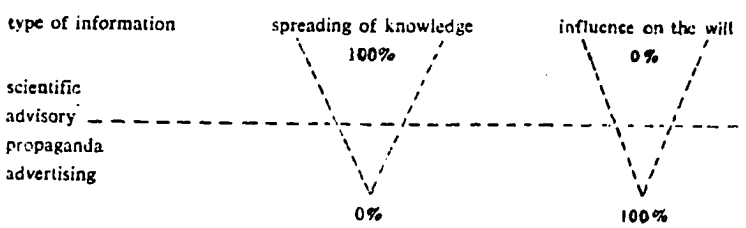
Rees and Schultz, 1966:

> The early years of information retrieval were characterized by a primitive conceptualization of the total communication process. The "information problem" was grossly misunderstood in that retrieval was mistakenly equated with communication and information transfer. . . . It is now recognized that retrieval systems are but one component of a total information transfer system encompassing both formal and informal channels of communication. (pp. 143-144)
>
> . . . .
>
> Our design of retrieval systems must be related to the behavior of the user as the generator, requester, and ultimate processor of information. Communication and information transfer involve the processing and application of information by the users in addition to the acquisition, storage, retrieval, and dissemination functions performed by librarians or retrieval systems operators. Document delivery cannot be equated with document usage. (p. 144)

Maltha, 1967:

> *Two information chains are distinguished, firstly from experiment to experiment and secondly from experiment to application. Information transfer therefore takes place at different levels. We can distinguish:*
> *the scientific level*
> *the level of management in the factory and of advisors*
> *the practical or applied level.* (p. 17)
>
> . . . .
>
> An important aspect of information transfer in the second chain is the transition from the spread of knowledge to the influencing of men's wills.
>
> The purpose of information transfer in the second chain is always the application of the results of scientific experiments.
>
> . . . .
>
> Thus the advisory service lies between scientific communication on the one side and propaganda and advertising on the other. (p. 22)
>
> . . . .

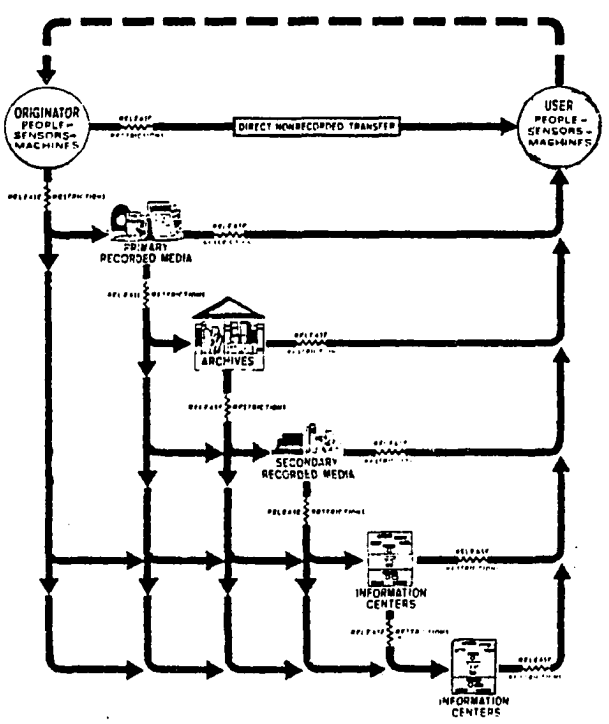
SCHEME OF THE SPREADING OF KNOWLEDGE AND OF INFLUENCE ON THE WILL



(p. 23)

Murdock and Liston, 1967:

> [Information transfer, or information science and technology:] Inherent in at least one set of definitions of the words "knowledge" and "information" is the concept that an item of knowledge becomes an item of information when it is "set in motion"--when it enters the active process of being communicated or transferred from one or more persons, groups, or organizations (sender) to one or more other persons, groups, or organizations (receiver). Many people will argue that knowledge as defined here has no intrinsic value--that only when it is successfuly transferred is its value to be realized. Others go further, arguing that the value of information cannot be realized until it is actively applied in decision making. Either of these viewpoints must necessarily concede that value is dependent upon transfer. (pp. 287-288)
>
> . . . .
>
> [The general model of information transfer] is based on the classic send channel receiver concept. In this case, there is a variety of alternative channels. (p. 288)
>
> . . . .
>
> In a gross sense at least, the entire information transfer model is cyclic in that users (as a group) are the same people, sensors, or machines as the originators (as a group). Even an individual has the problem of communicating with himself across the time span of present to future. (p. 290)
>
> . . . .



(p. 289)

Weisman, 1967:

> Documentation is a well established term in Europe, where it has been commonly used for a number of decades to refer to the literature of science and its handling in all its forms. Documentation, there, is concerned with the theory and practice of producing storable items of information in a form of convenience to the subsequent researcher, and so organizing them as to facilitate their retrieval and the dissemination. In general, in this country [the U.S.], the use of the term documentation denotes documents; and the documentation specialist or documentalist is looked upon as a custodian of or the handler of documents. We have been careful, in this country, to differentiate between document storage and retrieval, and information storage and retrieval.
>
> Information science . . . was born out of the technology that produced data and information processing equipment. As a term, it is scarcely more than six years old; it made its first appearance as science information. Reflection on the requirements for the competent processing of science information led to the coining of the term and the field of information science which is concerned with the properties, behavior, and flow of information: What information is; how it is gathered, processed, and stored; how it is expressed and communicated; and how it is used, by both individuals and man-machine systems. (p. 8)
>
> . . . .
>
> Information science is a basic and major component of communication; it studies the creation, management, and exploitation of recordable knowledge. (p. 11)
>
> . . . .
>
> Communication sciences, in my opinion, is an interdisciplinary discipline whose concerns are the multiple processes of communication and exchange of information by natural and artificial systems. Within its study are natural (human, animal, and insect) and artificial languages (including codes used in communication systems, design languages, programming languages for computers, and the formal language of mathematical logic) as modes of communications. (pp. 11-12)

Graziano, 1968:

> The proper concern of the science of documentation then may be thought of as consisting of the operational methods of identifying elements, distinguishing elements from each other, and for transmitting sets of patterns from one time and/or place to another in such a way so as not to destroy the power of the symbols to convey exact concepts. The concepts transmitted in themselves are not directly of concern to the science of documentation; rather, the operational methods must be so generalized as to be able to carry, that is to transmit concepts without adding, taking away, or changing. (p. 86)
>
> . . . .

[The field of documentation] properly concerns itself with this class of phenomena (information), when it develops the methods, both intellectual and physical, for the most effective transmission of concepts by means of modulated states of energy which are in themselves the operations of format transformation, and which include the whole physiochemical process of format conversion which relates to the interface of the human nervous system with external energy states. (pp. 88-89)

. . . .

By information I mean the physical substance, in the form of energy, of the idea or concept which is conveyed from one mind to another, ultimately by energy transference. (p. 88)

Salton, 1968:

Information retrieval is a field concerned with the structure, analysis, organization, storage, searching, and retrieval of information. . . . [The] use of modern computing equipment and sophisticated language processing methods appears to provide the necessary means for generating acceptable solutions [to information handling problems]. (p. v)

. . . .

An information dissemination system may be used to assist in and to control, to some extent, the generation, recording, analysis, classification, storage, search, and retrieval of information. Information in this context may consist of data items, such as facts or measurements, or it may consist of written texts, documents, books, summaries, abstracts, titles, and so on. The information dissemination process is best described in terms of three main components: information generation, information processing, and information utilization. . . . The first component, information generation . . . is presently not a part of any formalized system but is handled by personal communication between the parties involved. (pp. 4-5)

. . . .

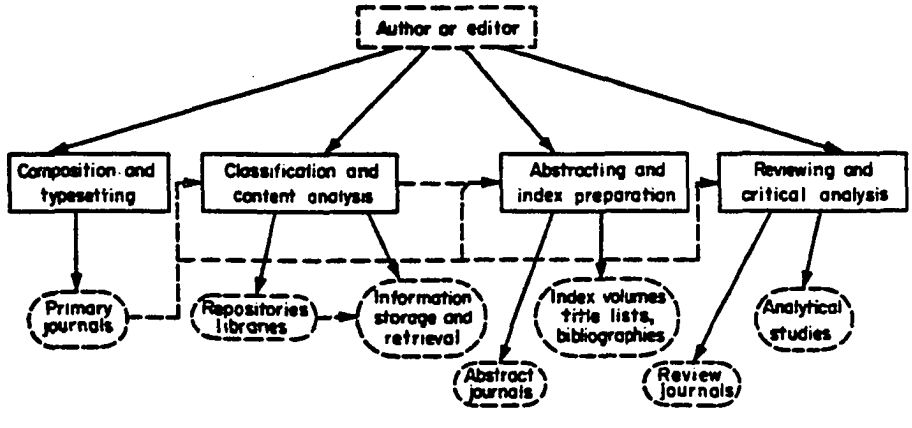


Fig. 1-1 Information generation and dissemination.

(p. 4)

Harmon, 1969:

> Information science is viewed as a member of a class of integrative disciplines which emerged during the same time period in response to the same prevailing problem--the unity and use of science.
>
> . . . .
>
> Using the analogy of blind men studying the elephant, information science, as well as general systems theory, general semantics and similar fields, appears to be studying the same massive elephant. As blind men can assist each other in forming a helpful gestalt conception of their elephant, so can the interdisciplinary studies assist each other. (p. 459)
>
> . . . .
>
> The aims of these disciplines [information science, the newer behavioral sciences and several others] are similar, though their approaches vary. They seek optimal communication and interaction between and among men, machines and nature. Collectively the integrative disciplines appear to be involved in a unity and use of science movement. They focus on systematic intrapersonal and interpersonal communication, through variable space and time contexts, in order to promote adaptive behavior in the cooperative or competitive pursuit of valued ends. (p. 462)

Klempner, 1969:

> Information science is analyzed to be comprised of the segments of: (1) Conceptualization, (2) Storage/Transmission, and (3) Utilization. (p. 339)
>
> . . . .
>
> Activities in information science employing the conceptualization process may be said to include: indexing, abstracting, classification, thesaurus-building, subject-heading work, document selection, development of interest profiles, and a number of other similar activities.
>
> . . . .
>
> Information science can and does concern itself with the <u>physical</u> attributes of symbols and signals, their production, storage, transmission, and manipulation. This segment of information science I have labelled the <u>Storage/Transmission Segment</u>. (p. 340)
>
> . . . .
>
> [Information science] investigations would seek to emphasize here . . . the means of storing and transmitting symbols and signals . . . the storage transmission channels, their networks, their efficient organization and administration, but not with that which is transmitted, i.e., the information itself.
>
> . . . .
>
> Should not information science delimit its interests to those symbols and signals that have a direct bearing on the transmission of previously recorded information, i.e., document-stored discourse?
>
> . . . .

> [In] the Utilization Segment of the information science field . . . we can identify and group such activities as relevance assessment, management appraisals, evaluation of community satisfaction or the satisfaction of national or international cultural, ethical, recreational or socio-political goals. (p. 341)

Klempner, 1969a:

> Information science is analyzed to be comprised of the segments of: 1) Conceptualization, 2) Storage/Transmission, and 3) Utilization. (p. 335)
>
> . . . .
>
> Information science can and does concern itself with the physical attributes of symbols and signals, their production, storage, transmission, and manipulation. This segment . . . is here labeled the Storage/Transmission Segment. . . . What our . . . investigations would seek to emphasize here would be the means of storing and transmitting symbols and signals; we would be concerned with analyses of the storage/transmission channels, their networks, their efficient organization and administration, but not with that which is transmitted, i.e., the information itself. (pp. 337-338)
>
> . . . .
>
> Should not information science delimit its interests to those symbols and signals which have a direct bearing on the transmission of previously recorded information, i.e., document-stored discourse? . . . with those communication channels which permit crossing the barriers of both space and time, i.e., providing capability for both storage and transmission.
>
> . . . .
>
> The phonodisc, the cuneiform tablet, the computer tape or the magnetic disc, the full-size manuscript, and the text or its microform can be viewed as storage/transmission channels capable of transcending the barriers of both time and space. . . . In a broad sense, individual documents . . . can be considered to be storage/transmission channels providing a link through time and space between that which has been conceptualized and recorded in the past throughout the world, and the user of today, wherever he may be located. (p. 338)
>
> . . . .
>
> Perhaps we should have done what has been done in the USSR; i.e., adopt the term informatics rather than information science to reflect more adequately the theoretical, applied, and social aspects of our field. (p. 340)
>
> . . . .
>
> The field of information science is concerned with the study of both men and machines. (p. 341)

Liblaw, 1969:

> For the most part, those documentalists, archivists, and others concerned with extracting, arranging, storing, retrieving, and disseminating scientific and technical information, quick as they have been to see the value of data processing technologies to their tasks, have been slow to relinquish the traditional view that their work begins only after the original messages in which they are interested have already appeared in print. (p. 382)
>
> . . . .
>
> A new model of the information transfer process formulated . . . by taking a systems approach . . . is an imbricated (overlapping) pattern of processes. It can be diagrammed as shown in Fig. 2 [below], where only a few of the possible interrelated processes are depicted for the sake of simplicity. The fact that each of the depicted processes involves originator, channel and user components and can involve feedback loops is also omitted from the diagram for the sake of clarity.
>
> . . . .
>
> From the model it becomes clear that through the use of a machine-readable record, the process of producing a printed page becomes an integral part of all the other processes involved in information-transfer technologies, neither preceding nor following them, but taking place concurrently with them and requiring no parallel or duplicative efforts. (p. 383)
>
> . . . .

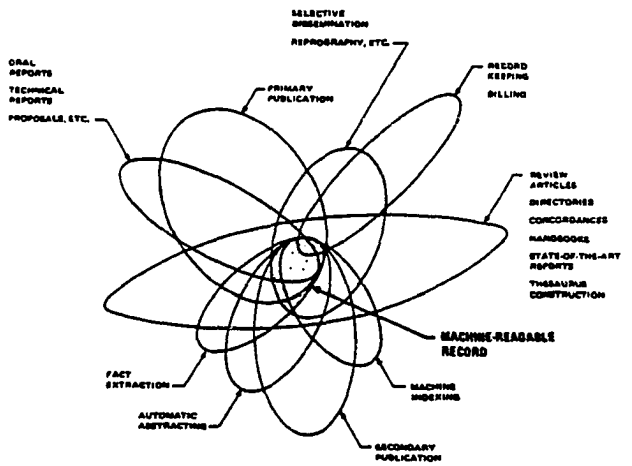


FIG. 2. Cognitive Systems' Imbricated Model of Information Transfer. (p. 383)

Merta, 1969:

> Informatics, which some authors also call informatistics, informatology, exagelectics, documentalistics, theory of scientific information, semantic theory of information, etc., is a new, arising branch of science, which has sprung up as a result of a study into the influence of information circulation (exchange) for the existence

> of human society. Informatics includes theoretical, experimental and applied fields, . . .
> . . . .
> [A theory of informatics concerns] the transformation of knowledge into communicable information by means of creating information sources and their circulation in the society through various channels. . . . (p. 32)
> . . . .
> [The task of theoretical informatics] is to study the sources of origination, circulation and utilization of information, to bring to light objective and subjective factors showing in the nature of low exchange of information in separate components of social life and the human society as a whole. The conclusions of this theoretical discipline must contribute to creation of optimum conditions of information origination and interchange, i.e. to creation of information systems both of individual and social type (pragmatic aspect of informatics). (p. 33)
> . . . .
> Generally speaking, publicistic and cultural information also belong to the sphere of informatics. (p. 34)
> . . . .
> [Its] object is to study and create social links and transmission (exchange) of information. The social contacts are a material, objective aspect of communication, whereas transmission is its non-material component. From this standpoint, informatics is a part of the general theory of communication. (p. 36)

Mikhailov, Chernyi, and Gilyarevskii, 1969:

> [A] new discipline, informatics, has emerged whose main object of study is the scientific information process in all its complexity and whose main task consists in increasing the efficiency of communication between scientists and experts. (p. 12)
> . . . .
> The subject matter of informatics are processes, methods and laws related to the recording, analytical-synthetical processing, storage, retrieval, and dissemination of scientific information, but not the scientific information as such which is the attribute of a respective science or discipline. . . .
> [The] term "scientific information" is used . . . to mean the logical information which is obtained in the process of cognition and which adequately reflects the laws of the material world and of spiritual activities of human beings and is utilized in the socio-historical practice. (p. 14)
> . . . .
> [Library] bibliographical activities [involving only the traditional means of information dissemination such as books, periodicals and the like] . . . [were separate from] all processes associated with the collection, processing, storage, retrieval and dissemination of documents to unite them under the general name of "documentation". At present this term is regarded as a synonym of "informatics", although informatics studies the laws governing all forms of

information activities, as well as their theory, history, methodology, and organization, rather than the documentary activities only.

Thus informatics is in a way a continuation of bibliography and library science, but the experience inherited by informatics from these branches of science is being subjected to complete reappraisal and appears in a new quality. (pp. 20-21)

Penland, 1969:

Retrieval communication is concerned with the transfer of information as requested by an individual who interrogates documents. (p. 479)

Tou, 1969:

Concerned with the theoretical basis of the organization, control, storage, retrieval, processing, and communication of information both by natural and artificial systems, information science is multidisciplinary in character. It covers a vast area of subject matter in the physical and biological sciences.

The proliferation of information in recent years has stimulated rapid development in a field which is achieving its own identity and playing a central role in modern engineering. (p. vii)

Wooster and Ives, 1969:

Information science is involved with basic research leading to a more efficient transfer of information in such significant diads as man-man, man-machine, and machine-machine. Efforts to define an abstract family of languages promise to identify fundamental principles leading to a better understanding of both internal and external machine communications. (p. 35)

. . . .

Any machine, which in the broad sense includes man, must make constant use of information. This would naturally include sensing, channeling, integrating, storing, outputting, and feeding back the processed information. (p. 64)

Yovits, 1969:

[Information science is] the branch of study concerned with the properties of information flow in a generalized information system.

. . . .

It is contended that all of the functions indicated [in the generalized information system model] must be present for any meaningful analysis of information flow . . . that only in such a model does information really have any significance. General discussions of the storage of knowledge or data without reference to the potential uses lead nowhere, or provide minimal fruitfulness. (p. 374)

. . . .

[The model of the generalized information] system is comprised of four essential functions. There is an Information Acquisition and Dissemination function (IAD), a Decision Making function (DM), an Execution function (E), and a Transformation function (T).

. . . .

Each function is seen to collect, store, operate, and disseminate. (p. 372)

. . . .

Without some type of interaction with the environment, it is not possible to measure or even to know of its existence. This interaction will result in some type of a physical action which is measurable, or more precisely--observable.

Such a physical action or observable action will take place as a result of the decision-making process apparatus. . . . Since the decision maker . . . makes his decisions solely on the basis of the information he receives, it is clear that this is the mechanism by means of which information is transformed into physical, observable actions.

The class of situations not encompassed by this model, namely, the kinds of situations where knowledge or data are transmitted without any eventual anticipation of being put to use by a decision maker may have some intellectual interest. This class of situation would appear, however, to be of little other interest. It is inherently sterile, and by its very nature will cause no interaction with the environment, thus making it logically impossible to say anything quantitative about it. (p. 371)

. . . .

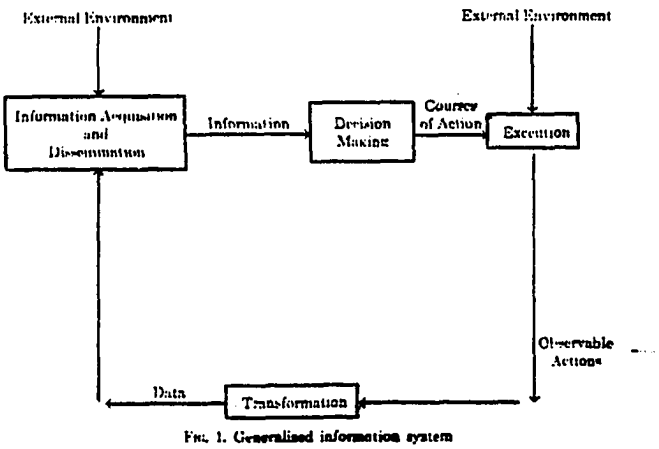


FIG. 1. Generalised information system

(p. 372)

Borko, 1970:

In information science, systems analysis is used both as a general approach to the study of information systems and as an application of scientific techniques to the solution of specific information transfer problems. (p. 5)

. . . .

[An] analysis of information systems must begin with an understanding of information science--the theories of information science form the conceptual foundations of information systems. . . . (p. 6)

. . . .

An Information System is that combination of human and computer-based capital resources which results in the collection, storage, retrieval, communication and use of data for the purpose of efficient management (planning, decision-making, reporting and control) of operations in organizations. (p. 7)

Goffman, 1970:

The aim of a discipline of information science must be that of establishing a unified scientific approach to the study of the various phenomena involving the notion of information whether such phenomena are found in biological processes, human existence or the machines created by human beings. Consequently, the subject must be concerned with the establishment of a set of fundamental principles governing the behavior of all communication processes and their associated information systems.

It is very important to distinguish between processes and systems. . . . In general, a process is a time dependent phenomenon, i.e., a sequence of actions leading to some result. A communication process is thus a sequence of events resulting in the transmission of information from one object to another. The first object is called the source and the latter the destination. A system . . . is the mechanism by means of which a process is realized. More precisely, a system is a collection of elements interacting to perform a specific function for a specific purpose.

Systems whose functions are the carrying out of communication processes are known as information systems. Such a system will take the information at the source and operate on it in some way to produce a signal suitable for transmission on some channel to a receiver at the destination. . . . [A] primary task of information science is the study of the properties of communication processes which may then be translated into the design of the appropriate information system for a given physical situation. (p. 591)

. . . .

The fundamental notion underlying the behavioural problem in communication is the notion of effective contact between the information source and the destination. For example, effective contact is clearly the governing factor in the outcomes of the two most familiar communication processes, namely the transmission of knowledge and the transmission of disease. It is thus not surprising to find a striking parallel between these two processes. (p. 592)

Goffman, 1970a:

> Information science aims at being a unified scientific approach to the study of the various phenomena connnected with the notion of information. These phenomena can be found in biological processes as well as in human existence and the machines created by human beings. Thus, the subject has evolved as a synthesis of methods drawn from the traditional disciplines for the purpose of studying the multivaried aspects of information flow within a population of objects be they human beings, micro-organisms or machines. Information science, therefore, is essentially concerned with the principles underlying communication processes and their associated information systems. (p. 726)
>
> . . . .
>
> Because the principles underlying the spread of infectious disease also govern the diffusion of information and the spread of knowledge, a communication process can be represented as an epidemic process. (p. 728)

Ladendorf, 1970:

> [The] process of information flow is a complex one, involving interfaces between a number of publics, involved networks of interpersonal contacts, a wide variety of communication channels, and such human factors as competition for status and resistance to change. This whole process of communication is a dynamic one, and it is in a constant state of flux, adapting to changes in the research frontiers and states of the arts of science and technology, as well as the migration of people into and out of its fields of coverage. . . . [At] any point in this complex process, information flow always breaks down into communication between individuals and the increase or modification of knowledge stored in their brains. All that information science can attempt to do is to facilitate this process insofar as this is possible, and this necessarily requires quite a precise knowledge of user habits and needs.
>
> Basically, users of information systems can be broken down into two types: scientists, and engineers or technologists. (p. 216)
>
> . . . .
>
> The indexing and retrieval of documents present far fewer problems to the designer of information systems than does the study, analysis, and modification of the human behavior patterns of his clients. (p. 215)

Mason, 1970:

> [Information science] can be defined as the study of the processes involved in the exchange and correlation of knowledge. It will thus range from the physical, i.e. the quantitative measurement of information systems, to the psychological, i.e. the qualitative assessment of the effects of information systems and services on sentient beings, including here particularly the study of both the man/man and the man/machine interface.

. . . .
[In] the main we are involved in those information systems which relate to recorded knowledge in all types of media, and with methods of exploiting that knowledge, . . . (p. 309)

Otten and Debons, 1970:

The fundamental nature of information per se can also be demonstrated by the processes of information transmission or communications in general. Any transmission link can, in principle, be used to transmit every kind of information. A communication channel provides the means for the transmission of information. This involves the transmission of a physical signal. However, this signal can be used to convey any form of information. For example, it can convey information expressed in the language of computers, information in the form of speech, of graphics, or even of motion pictures (TV). The operations performed in transmitting the various physical representations of information are one and the same; . . . (p. 90)
. . . .

Information is generated, processed, and used by men. If machines are involved in handling information, these machines generate, process and use information under the control by man and for man. (p. 92)

Saracevic, 1970:

At the base of information science is a concern about man's communication processes. . . .

A communication process can be thought of as a sequence of events resulting in the transmission of something called information from one object (usually referred to as the source) to another (the desintation). We may not know what information is, but we can study its various manifestations, properties and effects. . . . (p. xix) Thus, information may be viewed as a complex phenomenon with a variety of physical, biological, and behavioral properties. . . . [The] special interest of information science is to study a variety of properties of information and communication processes <u>not</u> in isolation, but in that dynamic and mutual interaction which shows their interrelation and interdependence. In other words, the basic subject matter of information science is study of the behavior, properties and effects of information in all of its facets and study of a variety of communication processes affecting and being affected by human beings.

Communication processes are carried out by means of systems, referred to here by the generic name, <u>information systems</u>. . . . Thus it is also of interest in information science to study the structure, objectives, functions, properties, behavior, and performance of information systems.
. . . .

[Information] science is viewed here as basically a science- and research-related discipline rather than a practice- or technology-related discipline. (p. xx)
. . . .

> Communication studies significant to information science are those which deal with communication of human knowledge, because this is (as far as human activities are concerned) the most important communication there is. In the realm of information science, the study of the communication of knowledge has been conducted from two different approaches: one is the study of the behavior of literature, using mostly statistical and mathematical approaches, and the other is the study of the behavior of users of information, using mostly psychological approaches. (p. xxi)
>
> . . . .
>
> It is believed that all information systems share the following five basic functions (loosely defined):
>
> (a) Acquisition — getting the material ("information," "data," "knowledge," "books," "commands," "signals," etc.) which at a minimum implies some selection process.
>
> (b) Information Representation — conceptual handling of the acquired material in some representative form and structure, which at a minimum implies a language (natural, artificial, indexing, classification, coding, etc.) or some combination of languages.
>
> (c) Organization of Files — storing of materials and/or storing of their representations, which at a minimum implies physical arrangement.
>
> (d) Question Handling and Search Procedures — getting whatever is in the system out in some organized and delineated fashion, which at a minimum implies the ability to search on a restrictive basis; i.e., it implies an output selection process.
>
> (e) Dissemination — distributing of the output, or displaying it in some organized form, which at a minimum implies arrangement of both a conceptual and a physical nature and distribution patterns. (p. xxii)

Wersig, 1970:

> Looking at the traditional form of documentary activities, reference documentation, the general model of communication changes evidently.
>
> The communicator creates a message. This message is sent now to the publishing house, a meaning-mediator. The publishing house may change something (in some cases the message may be translated from one language to another) and then publishes it (by using signal-mediators, that means the original message is coded from one representational form to another one). Then the published message is transported to another kind of mediators, the book-sellers. The book-sellers themselves are signal-mediators, but book-sellers and publishers often do advertising or something similar, and by means of advertising they become part of another meaning-mediating process.
>
> Since the documentation agency is informed that there is a message, the message itself is rather different from the original message the communicator (or in terms of documentation: the originator)

had emitted. Now the documentation agency itself begins to take part in the message-transforming process: It analyzes the message, selects the concepts it thinks to be relevant, and so on. Then it produces descriptions of the message (which often is called the original message, but it is not) which is in fact a very serious act of meaning-mediation. Often the descriptions of the documents are sent to the user. These "documentary documents" should enable the user (the recipient in the whole communication process) to select those messages which may be helpful for his personal information needs. (p. 4)

. . . .

Documentary communication is a complex communication process of the structure: A transmits a message, the mediator B mediates the message, the mediator C mediates the message, and a recipient D receives the message. Possibly the whole process may be simplified by splitting the complex process in two partly independent processes which form a communication chain. The structure of a communication chain is: A transmits a message to B, B transmits a message which is caused by the message of A to C, and so on.

Therefore the proposal for a solution of the problem is that the documentation agency should not act any more as a mediator in the process of documentary communication, but as a communicator (this is done partly by information analysis centers).

. . . .

The agency should not have any communication intention of its own. The only intention it should have is the intention to optimize specialized communication referring to the information needs of its users. Its communication intention therefore only can be an informing one. It should not forget that it is no real communicator, but tries to adopt the role of the communicator/originator who is widely separated from the recipient possibly needing his message. (p. 6)

Yovits and Ernst, 1970:

Information Science has been defined in terms of the study of information flow in the Generalized Information System. (p. 26)

. . . .

The system is comprised of four essential functions. There is an Information Acquisition and Dissemination function (IAD), a Decision-Making function (DM), an Execution function (E), and a Transformation function (T). It is suggested that most situations involving the flow of information can be described by the model. These situations would include the use of information by the research scientist or the development engineer, management of a large corporation, command and control of a military engagement, or relatively straightforward and simple activities, such as the switching on or off of a thermostat-furnace system. (p. 3)

. . . .

Each function is assumed to collect, store, operate, and disseminate.

. . . .

In any realizable and operational system all the indicated functions must be present.

. . . .

In particular, the DM function is a most important one and may be established as the key consideration in the entire information flow process. For present purposes, the DM function represents any system component accepting an input from the IAD and providing an output to E. The DM may be an individual or organization (man-man system), a man-machine, or machine system. In any of these cases the DM transforms information into observable actions. The input to the DM is information, some of which may be stored or "held in memory." (p. 4)

. . . .

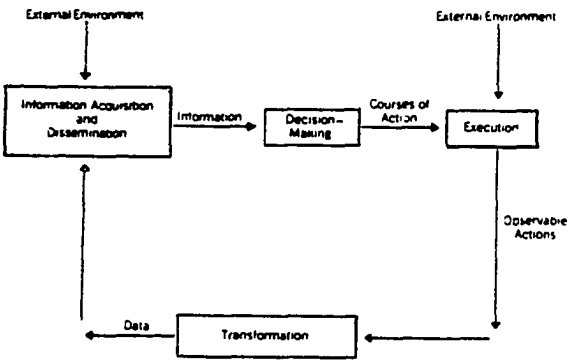


Fig. 1 Generalized Information System (p. 4)

Cestac, 1971:

In our field of information science . . . [let] us content ourselves with this concept of scientific information, covering specific functions such as:
- detection (gathering)
- identification
- abstracting
- dissemination
- storage of data and documents.

Let us suppose that the above outline is of interest to . . . documentalists. . . . (p. 86)

Malan, 1971:

[Information science:] studying the processes and methods, channels and aids concerned with the dissemination of knowledge and information. (p. 249)

. . . .

The question may well be put at this stage as to what the actual difference between communication science and information science is. Is it not possible that these two fields--if they actually are two distinct fields--are interrelated to such a degree, that we are concerned here with only one field of research? I can only believe that these two fields will eventually be so closely associated, that we may and can treat them as one and the same field. (pp. 252-253)

. . . .
[The] following fields of study can be crystalized.
1. Documents
This field concerns selection, acquisition, organizing, storage and retrieval of documents.
2. Information
In this case we are concerned firstly with the selction, acquisition, organization and storage of information and secondly, with the retrieval, selection, evaluation, interpretation and presentation of the information. (p. 254)
3. Information discipline
In this case we are interested in the methods of obtaining, flow, conveying, and use of information.
4. Management and organization
This is an aspect of information science that has as yet been almost untouched.
. . . .
Closely related to this last aspect lies the practice of systems design and analysis that effectively relates people and machines for the control and dissemination of specialised knowledge. (p. 255)

Mikhailov, 1971:

Science-information activities are an institutionalized variety of scientific work, pursued with a view to increasing the effectiveness of research and development work, which consists in collecting, analytico-synthetic processing and storing the science information recorded in documents, as well as in providing this information to research workers and specialists whenever it is needed and in the most suitable form.
. . . .
Also evolving is a new scientific discipline, informatics, which is concerned with the patterns and general properties of science information as well as the laws governing all communication processes, including those of science-information activities. (p. 99)

Mikhailov and Giljarevskij, 1971:

Informatics is a scientific discipline which studies the structure and characteristics (but not the specific contents) of scientific information, as well as the rules of scientific information work, its theory, history, methodology and organizattion.
The purpose of informatics consists in developing optimal methods and means of presentation (recording), collection, analytico-synthetic and logical processing, storage, retrieval and dissemination of scientific information. Information science deals with semantic information, but is not involved in qualitative evaluation of this information.
. . . .
[Documentation] has been proposed for the designation of a specific activity of collection, processing, storage, retrieval and dissemination of documents, as distinct from librarianship and bibliography, . . . (p. 16)

. . . .

In Soviet professional literature a related term has been used rather frequently--"documentalistics". . . .

We believe that both these terms--"documentation" and "documentalistics"--are inadequate, for they lay the stress on documents whereas the subject studied by the discipline in question is the structure and characteristics of scientific information. Nor can we call adequate the term "theory of scientific information", which is also sometimes used in that sense, for the discipline embraces not only the theory, but also the methodology, history and organization; moreover, what is meant by "scientific information" in that term is actually "scientific information work". . . .

Specialists in this new discipline--informatics--likewise must have a name. Our suggestion is "information scientists". (p. 17)

. . . .

<u>Scientific information work</u> is a separate part of scientific work, which has become such in the course of the social division of this work. Its purpose is to provide the scientists and practitioners with all the information they need by means of collecting, analytico-synthetic and logical processing, storage, retrieval and dissemination of scientific information.

A specialist in a field of science or social practice, whose sole occupation is information work, is usually called an information specialist or officer. (p. 16)

. . . .

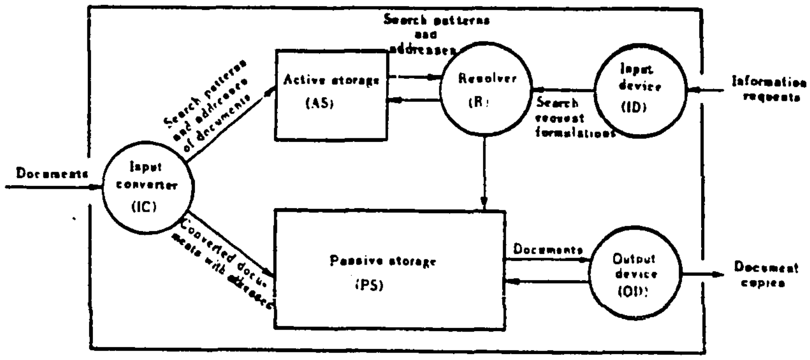


Fig. [illegible]. General block-diagram of an information retrieval system. (p. 176)

Based on the paper, by [illegible] Vleduts, "[illegible] issledovaniy po sozdaniyu informatsionno-poiskovykh sistem" (Some aspects of research in the development of information retrieval systems), in "Nauchno-Tekhnicheskaya Informatsiya", 196[illegible], No. [illegible], p. 32.

Wersig, 1971:

Only the . . . two approaches, that of effect [of messages] and that of the process of responsible action, refer to the field of information and documentation.

. . . .

We do not want to recognize all the existing structures of the world; we do not only want to transfer knowledge, data or meaning, but we want to take care that people will be informed, that they get

> the knowledge, data or meaning that they need, and that it effects something. The effect intended by information work may then be called "reduction of uncertainty". (p. 346)
> . . . .
> [There] are some sciences and branches of research which are centred around the effect approach to information, which are interested in the specific effects of messages reducing uncertainty. . . . [They] may be characterized as more socially or behaviourally-oriented, because they are interested in the effects on human individuals arising from concrete social conditions. To name some of these disciplines:
> - a discipline we call "information and documentation science", as it was first done in the German Democratic Republic. This discipline is concerned with the study of scientific and technical information systems. It is nearly identical with the "informatics" of the socialist countries and some narrow interpretations of "information science" in the Anglo-American countries. (p. 347)
> . . . .
> The information sciences as a whole are concerned with the study and development of the scientific basis of all kinds of information work, including the information work in science and technology. (p. 348)

Yovits and Mathis, 1971:

> [We] consider information science to be a broad discipline concerned with the generalized study of information flow. Information is defined as data of value in decision making and a "generalized information system" of virtually universal applicability is accordingly established. We then define computer and information science to be the study of information processing and information flow in this generalized system. (p. 118)
> . . . .
> Although this model was first developed to describe a military command and control situation, it was soon recognized that this model is much more general and highly descriptive and has virtually universal applicability as well. This model covers all aspects of information including its generation, collection, classification, transmission, and utilization. . . . . (pp. 119-120)
> This model has four main subdivisions referred to as functions. These are Information Acquisition and Dissemination (IAD), Decision Making (DM), Execution (E) and Transformation (T). Inasmuch as the central function of any system of this type is decision making we consider this to be most important. Information must be used for something. Information is seen to be used in making decisions and is seen to be the only resource available to the decision maker. (p. 120)
> . . . .

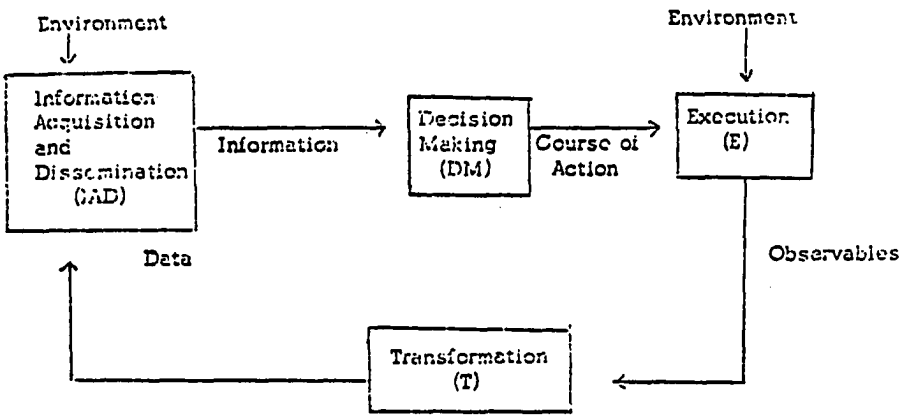


Figure 1 Generalized information system (p. 121)

Brandhorst and Eckert, 1972:

> Document Retrieval--the searching of a collection of documents (or document surrogates) in response to a question, and the detection of relevant documents (or references to documents) that either answer the question in themselves or that can be further scanned to determine the answer. Synonymous with "Reference Retrieval." To be distinguished from systems designed to retrieve directly useful data, i.e., data retrieval, fact retrieval, question-answering systems, and from systems for the actual physical storage, compaction, shelving, fetching, copying, or transmitting of entire documents. (pp. 379-380)
>
> Document Dissemination--the delivery of documents (or document surrogates such as references) to the information consumer. This may be in response to a specific inquiry/question/profile or it may be in response to general user interest in a given area (as in the form of an abstract journal).
>
> . . . .
>
> Retrieval is usually performed in order to disseminate. . . . . Whereas dissemination invariably follows retrieval, it can also take place independently. Document data may be captured, stored, manipulated, and promulgated en masse in the form of a secondary publication covering a period of time, without any retrieval operations per se being employed. The usual situation, however, . . is to find retrieval and dissemination closely intertwined in an information system. (p. 380)

Courrier et al, 1972:

> Information transfer involves a sender, a message, a medium, and a receiver. At its simplest, it is the movement of the message from the sender to the receiver through the medium, with the message finally perceived in such form that further action can be taken within the context of the overall system. . . . The movement of the message through the medium may be called transmission.

. . .

Information transfer is consummated and becomes communication when the information in the message is understood and appropriate action is initiated. . . .

In order for communication to take place, the sender and receiver should occupy a common sensory space. In contrast to transfer, communication usually involves a change in the state of the receiver, as well as of the sender. (p. 434)

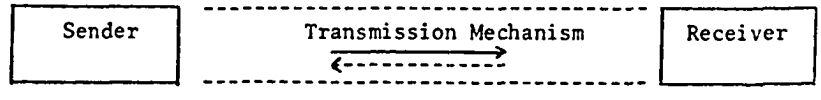
. . . .

[Information transfer] is an integral part of information science and a prerequisite for the design of effective information systems. Information becomes usable only when it is transferred; it is of little interest when it is simply stored.

Research in information science should focus on the transfer of information as the key to its use for the well-being of man. (p. 435)

. . . .

[Transfer] of information may be diagramatically illustrated using three elements. (p. 436)



(p. 436)

Debons, 1972:

My experience leads me to believe that there is indeed unity in the information phenomenon allowing for a precise definition of the term. Unity is found in the total information phenomenon. . . .

I submit that there are three relational components of the information phenomena, namely, information as the act of inquiry, or the process of inquiring, information as the act of applying the results of inquiry (such as decisions, problem solving), and information as the act of conveying the product of inquiry or decision to others (communication, or information transfer). (p. 477)

. . . .

Confusion arises if the process of transforming data to information is taken as equivalent to communication. The fact is that inquiry, decision, and transfer are distinct but related components. They make up the one basic information phenomenon. This conclusion arises from our reflection upon our experience of the unity of the same information phenomenon, namely, the informed act. (p. 478)

Foskett, 1972:

When I speak of "information science", therefore, I mean the discipline that is emerging from a cross-fertilization of ideas involving the ancient art of librarianship, the new art of computing, the arts of the new media of communication, and those sciences such

> as psychology and linguistics, which in their modern forms bear directly on all problems of communication--the transfer of organized thought. (p. 29)
> . . . .
> [Education for] information science must look beyond the concept of information processing, which is merely moving marks from one place to another, and begin to ask more pertinent questions, such as "Who needs information, and why?" "In what form?" "Who provides it?" "Where can it be found?" (p. 36)
> . . . .
> More attention must be paid to the question of how people use new information; how they assimilate it into their existing conceptual schemes and how these schemes may be modified in the light of the new knowledge. . . . Unless what we provide as information has meaning for the recipient, he will regard it as a nuisance, not a blessing; . . . (p. 37)

Furth, 1972:

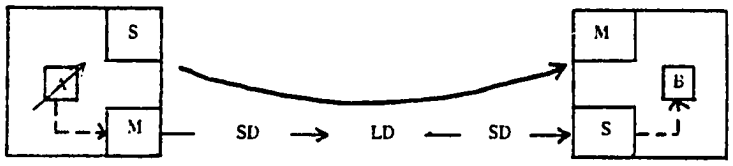
> [Two] aspects of information must always be considered: information as a coded fact and information as a process of knowing. In other words, all information can be viewed as a figural something that can be stored, retrieved, and transmitted; but at the same time it always has its origin in the knowledge of a person and finds its ultimate use in the service of a knowing person. (p. 21)

Heilprin, 1972:

> [In] information science communication is the <u>end</u> in itself and is chiefly confined to human mind-to-mind communication. (p. 23)
> . . . .
> Our first task will be to sketch a theory showing what communication is--how a message originates in a biopsychological medium <u>ab</u>, passes through a purely physical medium <u>bc</u>, re-enters a biopsychological medium <u>cd</u>, and conveys meaning from mental terminal C(A) to C(B). (p. 24)
> . . . .
> All messages may be divided into two classes: those of short duration (SD) and those of long duration (LD). . . . A message in its simplest form consists of two components. The first is some physical system, which we will call a "carrier," that is not in itself a message (e.g., radio waves without the voice or music "intelligence"; a blank sheet of paper). The second consists in discriminable marks on the carrier, such as images or sounds (SD) or printed letters or drawings (LD), which we will call "modulation."
> . . . .
> [Open-loop] communication is the principal domain of information science. . . . The proposed domain of information science is simply the set of all three-segment message paths (i.e., initial and final segments are living humans whose signal sending and receiving organs are appropriately matched to the channel of the signal in the

central segment, the environment; and sender-environment coupling occurs prior to environment-recipient coupling) such that the mode of signal propagation is usually but not exclusively SD-LD-SD (or briefly, "SLS"). (p. 28)

. . . .



C. SD-LD-SD: Usually blocks feedback
Open-loop communication

Figure 3 Effect of mode of propagation on coupling and control by source. ? = Variable Time Delay

(p. 27)

Heilprin, 1972a:

The present Fig. 1, an "information science path" (IS Path), can be understood in a number of ways. One is the representation of the physical path of propagation, in space and time, of a meaningful message from a central region or "mind" C(A) of individual A to C(B) in individual B. The diagram also represents the abstract geometric path in physical space. It can also represent an oriented, directional graph ("digraph") connecting A and B. (p. 120)

. . . .

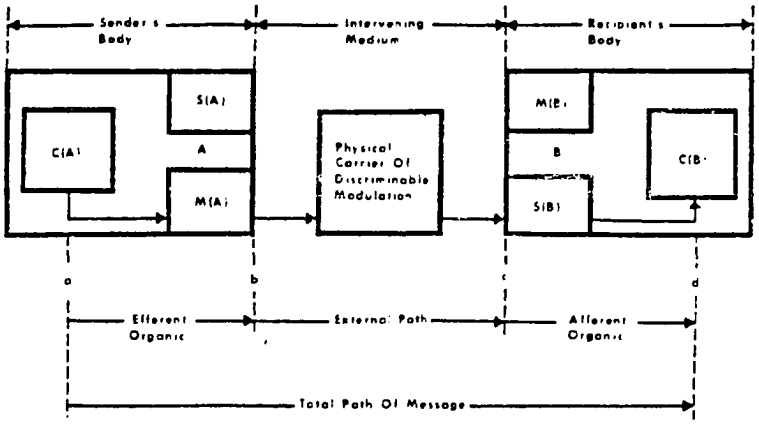


FIG. 1. Path of propagation of a human message.

(p. 121)

. . . .

Information science is the science of propagation of meaningful human messages. (p. 124)

. . . .

For IS, communication is the end, the main subject. . . . In IS the terminals are human beings. And the concept of communication does imply a completed mind-to-mind message. (p. 124)

. . . .

We have defined the terminals of an IS path at or in the minds of human beings. . . . An IS path consists, in a path of propagation,

of a message such that to both the initial stage (sender) and final stage (recipient) the message is meaningful. (p. 125)

. . . .

The IS path does not in itself define the domain of information science. A further step is to generalize from a single path between two individuals to a set of all such paths. (p. 129)

Kunz and Rittel, 1972:

Information scientists are providing the information environment for problem solvers. Their central methodological difficulty is to understand the logic of the problem solvers' problems and the structure of the knowledge they need. They professionally try to "break their heads" on behalf of other people, not only in the context of a particular problem, but a whole class of future problems. (p. 96)

Neelameghan, 1972:

The entity basic to information science is "information." Information is "idea" communicated, forming the basis of the choice of decision strategy by the recipient.

. . . .

An idea is the product of thinking, reflecting, imagining, etc., got by intellect, i.e., by integrating, with the aid of logic, a selection from the apperception mass and/or what is directly apprehended by intuition and deposited in the memory. (p. 140)

. . . .

An objective of information science is to aid the design and development of devices and methods helpful in increasing the efficiency of communication of ideas--whether it be directly man-to-man or through information-retrieval/document-finding systems. (p. 142)

Pietsch, 1972:

[Information science:] a comprehensive science of information with a subject and knowledge foundation out of which we have to provide the three partners in the information: author, informator, user with the corresponding data. (p. 57)

Pritchard, 1972:

However we may define information, and it must be admitted that all the definitions are unsatisfactory, the fact remains that something that we intuitively know as data, information or knowledge flows from an originator to a user of information.

. . . .

To define information transfer within a discipline we must know three things:
(a) the channels

(b) the rate of flow through the channels
(c) the interactions between the channels.

Let us first consider, though, an industrial plant such as a steelworks or a chemical plant--computer controlled, of course. (p. 37)

. . . .

In the flow of steel or chemicals through the process there is a constant monitoring of the plant variables which then form the basis for some control action--closing a valve, raising the temperature, etc.

. . . .

The information transfer process can be considered analogously to this industrial process. The substance flowing through the process is 'knowledge'. The channels are the media of communication and the process variables are such things as volume and growth of literature, scatter of literature, distribution by form, country and language, etc. (p. 38)

Szentmihályi and Szepesváry, 1972:

The elements common to all known definitions of "information science" (or according to another terminology: "informatics") are as follows:
- examination of the laws of a specific (scientific, technical etc.) communication process;
- the specific content of communication determined by the professional field in which it will be used; this communication is generally referred to as scientific information;
- the semantic character of communication and the communication effect that constitutes a link between the source of information (document) and the user;
- the possibility of feedback within the communication process facilitated by the storage and handling of information;
- the specific communication systems and subsystems of the communication process which make it necessary to establish and operate institutions and organizations of different levels and destinations. (p. 17)

Wellisch, 1972:

[Information science] is primarily concerned with words and the way in which they are used to record and communicate knowledge, . . . (p. 158)

. . . .

In central and western Europe, Documentation is still the official designation for the whole field, i.e., the study of recorded knowledge as well as its physical carriers (documents), . . . (p. 160)

. . . .

[Documentation] in the US came to mean only part of what it meant in Europe--the technology or the hardware, but scarcely ever the conceptual content or the software.

> This was probably the reason why a new term "Information retrieval" . . . was considered to be necessary and also why it was so eagerly adopted. Although originally meant to signify only the operations necessary to gain access to recorded knowledge irrespective of the form of documentary carriers and aimed at making a distinction between the physical and mental activities that have to be carried out to this effect . . . [information retrieval] became an "in"-word, and . . . the term supplanted "Documentation" almost entirely, and became virtually equivalent to the European idea of "Documentation". Somewhat later, it was realized that, to "retrieve" information from a place, it obviously had to be stored prior to the retrieval, so the term was augmented to "Information storage and retrieval" (ISR). (p. 161)
>
> . . . .
>
> [The] term "Scientific information" was sometimes used glibly and indiscriminately as a synonym for ISR. (p. 162)
>
> . . . .
>
> As far as can be ascertained by a fairly exhaustive search of the published literature, the term "Information Science" (IS) was first used in 1959 as a designation for the study of recorded knowledge and its transfer in the widest sense. (p. 163)
>
> . . . .
>
> [The] British reserve this term [information scientist] for scientists who are engaged in providing scientific information to other scientists. The underlying assumption is that information of a scientific nature can only be collected, interpreted and disseminated in a meaningful way by people who are themselves scientists and knowledgeable in the subject field concerned, and who can serve as professionaly accepted interpreters of information in a scientific environment.
>
> . . . .
>
> The discrepancy of views about what constitutes IS and what, on the other hand, is Science Information has contributed still further to the ambiguities of definition which plague the field. (p. 169)
>
> . . . .
>
> The adoption of the name Informatics for the study of information in all its aspects would be beneficial. . . . (p. 177)
>
> . . . .
>
> [If] the study of information is to become a science in the real sense . . . [it] can only try to discover and formulate the laws, if any, that govern the creation, transmission and reception of meaningful and therefore potentially informative messages. (p. 179)

Becker, 1973:

> Information science is the study of how man communicates with man. It is concerned with discovering better ways to get the right information quickly to the person who needs it, and with finding information later, once it is stored in libraries and other centers of information. (p. 17)
>
> . . . .

> Information science studies the way . . . different people use information in their jobs and provides effective methods for giving them the kind of information they need to do their job best.
> . . . .
> Information science is . . . concerned with the way different people create information, index or label it, store it, find it, analyze it, send and receive it, and use it. (p. 18)
> . . . .
> Information science. The study of how man creates, uses, and communicates information in all forms.
> . . . .
> Information system. A formal method by which information can be found, delivered, and used by those who need it. (p. 86)

Goffman, 1973:

> Information science is essentially concerned with the study of the principles underlying communication processes and information systems. In general, a process is a time dependent phenomenon, i.e., a sequence of actions leading to some result. Thus, a communication process is a sequence of events resulting in the transmission of something called information from one object to another. The first object is called a source and the latter a traget or destination. The mechanism by means of which a process is realized is called a system. Systems whose function is the carrying out of communication processes are referred to as information systems.
> . . . .
> An information retrieval process can be thought of as an instrument for providing effective contact between the source and destination within a communication process. That is, a process which, when properly carried out, assures that the information transmitted from the source to the target is relevant, i.e., results in the accumulation of knowledge at the destination. Since processes are realized by systems, information retrieval processes are carried out by information retrieval systems. (p. 234)
> . . . .
> Since information retrieval is a communication process, information retrieval systems are concerned with identification, recognition, and transmission of information. (p. 238)
> . . . .
> An information retrieval system must provide effective contact between its information source (its file) and its users. (p. 239)

Heilprin, 1973:

> In IST [theory of information science] to pass from level A [technical communication problems] to level B [semantic communication problems] requires a significant specialization of the GCS [general communication system] model. The new model, called an IS [information science] path, is the path of propagation of a meaningful message between, and semantically connecting, two minds. Its schematic diagram (Figure 1B) specifically replaces the GCS pairs, source-

transmitter and receiver-destination, by human terminals with their built-in cognitive-affective transformation stages. (p. 4)

. . . .

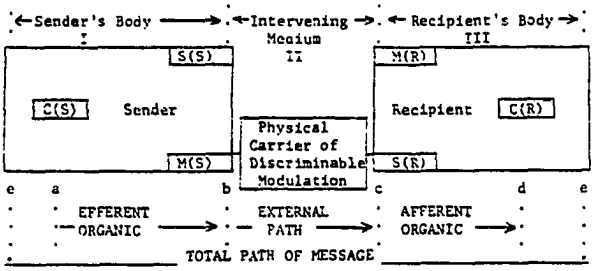


Fig. 1 5. PATH OF PROPAGATION OF HUMAN MESSAGE. IS PATH (HEILPRIN 1958) (p. 5)

. . . .

The concept of a real IS domain refers to the set of real paths of messages between human terminals. Any theory of real IS phenomena therefore has its real conceptual referents on or along one or more of the total set of real IS paths. (p. 6)

. . . .

[One] definition of IS might be the science of propagation of invariant patterns; or perhaps the science of propagating multi-level pattern invariances; or again, the science of artificial pattern conservation, in which "artificial" means "artifactual" and "conservation" has the same meaning as it has in physics. . . . Implied are human terminals of physical paths, semantically and cybernetically connected by material and mental artifactual patterns; and measures of pattern complexity and stability. (p. 7)

Horne, 1973:

There are four major components in Information Technology: (1) Human (info. proc.); (2) Information (data base); (3) Transmission (com. tech.); (4) Computer (data proc.). One and two are necessary but not sufficient to effect information transfer. Some transmission channel or carrier is needed, that is three. Four is optional in some cases. . . . The human is the ultimate information processor and user, . . . (p. 31)

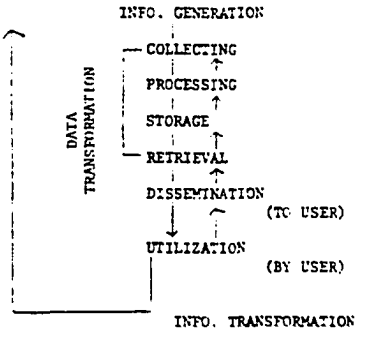
. . . .

Information is a usable answer to a user's question derived by a processor from a data base.

It might be argued that the human will some day be a non-essential in the system when computers equipped with sensors process collected data, solve problems, make decisions, and generate new data, all the while keeping each other informed and in good repair. But--until that day the human must be reckoned with.

. . . .

INFORMATION TECHNOLOGY IS INFORMATION SYSTEMS AND COMMUNICATION MEDIA



(p. 32)

. . . .

Communication Technology creates an environment through the use of various media of transmission enabling information flow as it proceeds from generation to dissemination for utilization. This flow is maintained by further generation and re-use of previously generated information. The flow from utilization to generation certainly exists but it is not clearly understood. The flow from generation to utilization is the transmission we are explicitly dealing with. The flow backward through the system or feedback is known to be necessary but seldom implemented. In this model the external data transformer is the machine (computer) and the internal information processor is the human. (p. 32)

. . . .

Concurrent with the development of the written and printed media came the development of a type of information system to fulfill the need for an external memory from which to retrieve on demand. This was called a library. Today because of electronic media and devices, Information Technology has become more complex and better organized; . . . (p. 33)

Kugel, 1973:

We need to provide a service that identifies the users' needs and helps to meet them--not the needs we think the users have but their real needs. . . . We need to understand what people are trying to do when they try to access or transfer information.

. . . .

There is, today, no . . . viable theory of information transfer.

. . . .

We simply don't know what it means to transfer information from one person to another, so that it is not surprising that we don't know how to do it well or help others do it better. (p. 128)

Langefors, 1973:

Information systems handle data to provide information. An information that any user in the whole system might find useful.-- Provided he is authorized to use them. (p. 11)

. . . .
By information system we mean here: A system of information sets needed for decision and signalling in a larger system (of which it is a subsystem) containing subsystems for
collecting
storing
processing
distributing
information sets.
Notice that decision processes are examples of information processes, whether performed by man or by machine. Also most information processes contain decision processes. Thus, the set of decisions in an organization is a part of its information system. (p. 195)

Licklider, 1973:

If storage and processing belong to the computer field, transmission belongs to the communication [technology] field. . . . (p. 168)

Otten, 1973:

It is suggested that the scientific study of information should consider the information transfer process as its basis. (p. 127)

Sparck Jones and Kay, 1973:

"Information science" may be interpreted very broadly as having to do with storage, retrieval, and transmission of information of any kind, in any way. (p. 2)

Tague and Carroll, 1973:

If the information scientist, then, is seen as a middleman or purveyor of information, what is he providing?
. . . .
The information scientist must learn to identify the true information needs of our total society, not just those of a small, inbred group. He must learn to cope with dynamic rather than static information needs.
. . . .
In many schools, information science and science information are synonymous. (p. 41)
. . . .
Information scientists must be trained to identify and characterize all the different information-seeking user sets--what one might call the receiver sets. Given these, they can then identify and characterize the sources actual and potential, which could satisfy these users--the generator sets. Also, the information scientists need to learn how to develop the mappings and transformations

which will provide to the users the information they need in a form they can use--the transmitter sets. Information science began with the Shannon model, but abandoned it. Perhaps the time is ripe for a re-examination and elaboration in terms of the total concept of information. (pp. 41-42)

Vickery, 1973:

> The emerging discipline of information science does not study communication to motivate or amuse, and communicating to instruct (education) is only of marginal interest. . . . [The] center of our study is informative communication. . . . However, we know very well that not all information transfer is via records--a great part of it is personal, face-to-face--and a new science would be unwise to restrict its scope to documentary transfer. (p. 150)
>
> . . . .
>
> [Information science] is concerned with that aspect of human communication the purpose of which is to inform; which is rarely a single act, direct from source to receiver, but is usually mediated, a chain of acts through intermediary sources; and which involves search activities by all parties concerned. . . . Information science is also concerned with the social aspect of this field of communication. (pp. 153-154)
>
> A fairly persistent search in sociological texts over the last few years reveals only modest contributions to the scientific understanding of informative communcation. Stripping the process down to its simplest terms, H.D. Lasswell recognizes five key aspects to communication: who, says what, in which channel, to whom, with what effect. These aspects can be rephrased as the concepts of source, message, channel or medium, receiver, and response. All the factors that can interfere with or distort information transfer are classed as noise, and the attempt to allow for this leads to repetition of content or redundancy. (p. 154)
>
> . . . .
>
> The subject of information science is informative communication, usually mediated and involving search on the part of both sources and receivers. Information received can lead to the operation of a routinized program, or to problem-solving activities. There are thus two forms of informative communication--the transfer of routine information; and the transfer of new information.
>
> Traditionally, the first form has been studied mostly as an aspect of management and administration, the second as the province of the information worker. . . . There may be a case for regarding both forms as part of the same discipline, but I prefer the present practice of restricting the field of information science to the communication of new information. (p. 160)

Vickery, 1973a:

> [Information science:] the study of the objectives, functions, structure, properties, behaviour, performance and effects of informative communication processes and information systems. . . .
>
> In its whole sweep, therefore, information work includes: science, that helps us to understand our problems; technology, that helps us to solve them; and the art of participating in each delicate interpersonal communication into which we are invited. The fusion of these three aspects of the craft creates a 'tiple glow' of optimal service. (p. 330)
>
> . . . .
>
> The urge and the necessity to impose some order on this medley [of document proliferation], to organise message transfer effectively and efficiently, brings about the devising and implementing of information systems. To design and operate a system needs an understanding of all its components, and the ability to weave them together into an effective and efficient whole. In this sense, information work is a technology, drawing heavily upon techniques that have been developed in the management of other types of enterprise. (p. 329)
>
> . . . .
>
> [An] information system can be viewed (1) as a system of interlinked entities (languages, symbols, signals, information items, articles, publications, guides, libraries, and so on), and (2) as a system of interlinked processes (encoding, transmitting, transforming, writing, publishing, translating, abstracting, lending, searching, reading, and so on). In reality, the entities particpate in the processes, and their interweaving is illustrated in an outline of documentary information flow shown in Figure 2.1, . . .
>
> . . . .
>
> Everything outside a system is its environment. Outside the information transfer system as a whole are the activities that generate and use information. (p. 21)
>
> . . . .

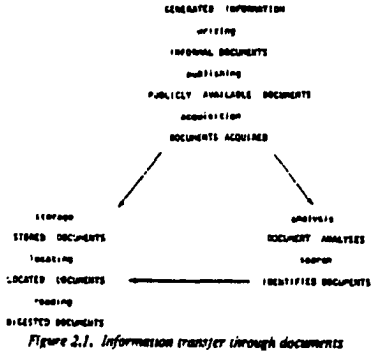


Figure 2.1. Information transfer through documents (p. 21)

. . . .

Consider the chain of processes previously suggested as basic to the information system, redrawn in Figure 2.2.

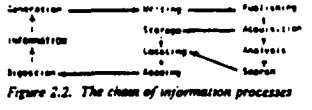


Figure 2.2. The chain of information processes (p. 24)

American Society for Information Science, 1974:

> [Information science:] the discipline that is concerned with the processes by which individuals communicate with other individuals over time and distance. . . . ("Author's Guide for the Annual Review of Information Science and Technology. Washington: American Society for Information Science. 1974. Quoted by Thompson, 1975, p. 385)

Debons and Montgomery, 1974:

> The distinctions between "data" and "information" have a distinct influence on the nature of information systems. Data can be considered as coded signals received from the external world by an acquisition subsystem (e.g., the eye, the ear, radar). Transformations of the data result in what we generally refer to as "information." The transformations can be undertaken by mechanical systems (such as computers and displays), or biological systems (e.g., the central nervous system). In either case the difference between data and information is postulated on the assumption that processes occur that change the state of the receiving agent (e.g., a person is "informed," or a machine has "information"). (p. 26)
>
> . . . .
>
> Information systems are environments composed of people, equipment, and procedures organized to achieve specific information objectives. . . . The objectives of an information system may be seen as the acquisition, processing, and dissemination of data (such as documents). Another major objective may be to aid in communication or in the decision function. Assuming that information systems are established to serve man in his attempt to deal with the external world, an information system can actually be said to have multiple, interlinked functions: the generation of information from data, the facilitation of the use of data or information for action selection, and the transfer of data or information to other systems or to people. (pp. 26-27)
>
> . . . .
>
> Document transfer systems are essentially environments that deal with the physical product of the information generation process. The document is a commodity where the acquisition, processing (cataloging, indexing), and dissemination functions depend on logistical as well as marketing principles. . . . Data access systems are collections of man-machine operations and technologies directed mainly to the acquisition, manipulation, and delivery of coded signals such as alphanumeric displays. Some information retrieval systems are data-access systems, while others are explicitly document-transfer oriented. Management information systems are environments of man-machine arrangemnts and procedures that are directed at augmenting human capabilities in dealing with planning, operational, and control data. (p. 27)

Koblitz, 1974:

> The subject of this science [information and documentation science] is defined in the GDR and in some other countries as the field of information and documentation activity (documentalistic information),

encompassing the analytico-synthetic processing, storage, retrieval and dissemination of special information on the basis of established user needs. Surely, this brief description calls for a fuller outline of this field. (p. 238)

. . . .

The activities that are encompassed by documentation and its position within the overall 'information and documentation process' are indicated. . . . (p. 245)

Working stage	Partial process of information and documentation	
1.	Production (documentation)	documentalistic information
2.	Storage	
3.	Search (retrieval)	
4.	Dissemination (transmission and reception)	

Table 4. Working stages of information and documentation.

(p. 245)

. . . .

"Information and documentation" can be thus interpreted as "documentalistic information" or, in an abridged form, "doc-information". (p. 247)

. . . .

["Information and documentation science"] is to be taken in the sense of "science of documentalistic information" and not as a a science having two objects, information, on the one hand, and documentation, on the other. (p. 250)

. . . .

[The] name of "information science" is needed for denoting the metascience of information and documentation science and its allied disciplines (library science, archival science, etc.). . . . (p. 251)

. . . .

[It] is necessary to create a science which would study the common features of all the activity fields of socially organized information, that is, a summary discipline that we shall call information science.

The need for the development of such a science of a wider scope has been recognised also in the USSR, where the name of "informology" has been proposed for it. As a "summary" science, it would be viewed as a meta-discipline in relation to "informatics". (p. 256)

Martyn, 1974:

This reviewer's viewpoint is that our field of study [information science] may one day become a science. If it does, it will be a 'soft' science, related to sociology and psychology, rather than

> an exact one. The term 'information' is the real handicap. If we abandoned the word 'information' and thought, instead, of 'communication,' we might develop a more meaningful and productive mental attitude. Our proper preoccupation is, after all, with the interrelationship of people and ideas. It is true that much of our daily work is concerned with the handling and processing of documents, the means of communication with the past, but experience is beginning to teach us that communication with the present is of at least equal importance. (p. 21)

Shreider and Uspensky, 1974:

> The study and refinement of scientific information work is the concern of a knowledge area which has been termed "informatics", . . . (p. 154)
>
> . . . .
>
> Informatics being an applied science is concerned with an optimal realisation of processes of "transmitting" (in the broad sense) scientific and technical messages. The principal property of such messages (on account of which the task of their "transmitting" arises) is "pertinence", in other words their utility in dealing with scientific and technical problems facing certain (if potential) users, and hence their (if potential) utility for the society in general. (p. 158)
>
> . . . .
>
> [Informatics] requires a thorough investigation of the mechanism of the process when a scientific message acquires--within the framework of some sign system and some class of users--the properties of meaningfulness and pertinence. It is only on this basis that informatics can develop its own criteria for optimising scientific and technical communication. (p. 162)

Smith, 1974:

> Briefly, Information Science is concerned with how man communicates with man. It is the study of how information is transferred--from the point of generation to the point of use--and all the intermediate steps of collecting, organizing, interpreting, storing, retrieving, disseminating and transforming information. As a discipline, Information Science stresses the application of modern technologies to the handling of information. (p. 78)
>
> . . . .
>
> As information scientists we are concerned about the large investment necessary to develop information utilities that permit economical on-demand access to information. . . . We are concerned about the effects and impact of information technology on the culture of our people. (p. 80)
>
> . . . .
>
> The focus of information activities and programs must be redirected from concern with document handling to the needs of the user. (p. 81)

Wersig, 1974:

> Information work for science and technology started in the middle of the 19th century; known as "documentation" since the beginning of our century. Until the early fifties of our century it only was a field of practical activity without the need of a corresponding scientific discipline. But as the growth of literature went on, new tools for data processing were developed and information needs became more complex it was felt that "documentation" or "information retrieval" could not go on only relying on practical experiences but needing a corresponding area of scientific research. By this the concepts of "information science" (anglo-american countries), "informatics" (socialist countries) or "information and documentation science" (Germany) emerged and began to resemble the single scientific and research activities in the field. (p. 171)
>
> . . . .
>
> "Information sciences" then are all the scientific disciplines concerned with information processes which are affected by systems of organized communication. (pp. 171-172)

Belkin, 1975:

> [The Soviet approach to information science understands it] as a goal-directed social science with a specific societal objective or purpose, viz., the most effective transfer of desired information from human generator to human user. Furthermore, exponents of this approach have initially specified concern with scientific (nauchnyi) information, . . .
>
> . . . .
>
> The use of the term scientific information in the statement of purpose of information science is generally justified by determining what in fact are the primary practical functions of information science, and noticing that they are concerned with the social systems comprised by the scientific activities described. . . . That is, the general Soviet view is that information science, or rather "informatics" aims to facilitate these activities by discovering and implementing the optimum means of communication of desired, purposeful information in the context of the scientific activities and their goals. (p. 57)

King and Wood, 1975:

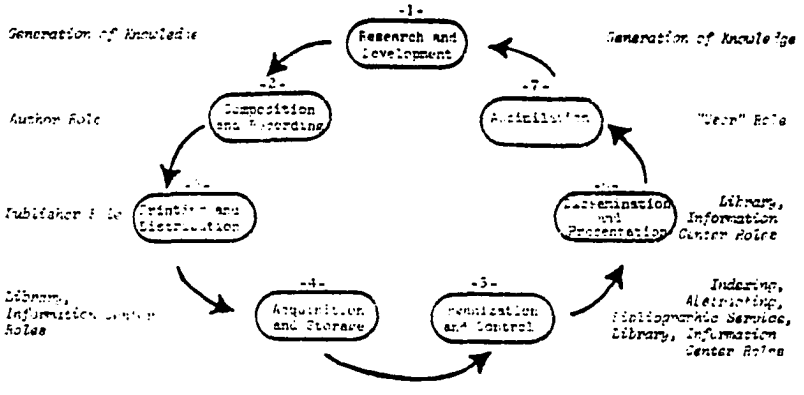
> [A] framework for a model of communication of scientific information . . . is chosen to isolate the functions of communication that have been most affected by environmental changes in the past and that are most likely to be influenced by innovations in the future.
>
> . . . .
>
> The diagram represents an information cycle based on published documents, although some of the functions described in it are applicable to other forms of communication as well. The cycle includes several independent functions necessary to achieve

communication. . . . As a result of scientific research projects, documents are Composed . . . . (p. 32)

. . . .

The Assimilation stage is the stage at which information (as opposed to documents) may be transferred. That is, a document may be studied and its contents assimilated by a user. At this point the user may be informed by the document (i.e., the state of knowledge on the subject matter of the document is altered). (p. 33)

. . . .



SCIENTIFIC AND TECHNICAL INFORMATION TRANSFER CYCLE (p. 32)

Krippendorf, 1975:

In receiver initiated communication, the information about the information needs precedes the transmission of information relative to the information that is transmitted; . . . (p. 34)

Peters, 1975:

Documentation. (1) The systematic collection, classification, recording, storage, and dissemination of specialized information, generally of a technical or scientific nature. (2) Written description of a computerized system's operating programs and facilities. (p. 54)

. . . .

Information processing. All technical and commerical operations performed by computers. Normally used in a more general sense than the term data processing.

. . . .

Information storage and retrieval (ISR). The process of retrieving documents from a storage place in response to a person's query; this may be a manual operation (e.g., a librarian taking a book off of a shelf in the library) or a machine operation involving a computer, a data base, or other automated records. (p. 85)

Wersig and Neveling, 1975:

> Nowadays the problem of transmitting knowledge to those who need it is a social responsibility, and this social responsibility seems to be the real background of 'information science'. (p. 134)
>
> . . . .
>
> [Information science] is based on the notion of the information needs of certain people involved in social labour, and of concern with the study of methods of organization of communication processes in a way which meets these information needs. The basic term 'information' can be understood only if it is defined in relation to these information needs .
>
> Either as reduction of uncertainty caused by communicated data.
> Or as data used for reducing uncertainty.
>
> This science is concerned with the organization of communication processes aimed at information for a specific clientele. This is a science somewhat similar to mass communication aimed at the fulfilment of the socially and individually justifiable information needs of a large public. (p. 138)
>
> . . . .
>
> A proposal which could be made [for a definition of information science], allowing a practical purpose approach while being still broad enough for practical applications (e.g. information systems in public administration) would have the following constraints:
>
> A distinction is made between organized and non-organized social communication, and the area of interest restricted to organized communication. (p. 137)
>
> A distinction is made between socially and individually justifiable information needs, and the area of interest restricted to those which are socially justifiable.
>
> A distinction is made between information needs related to social service and those which are not, the area of interest being restricted to those related to social service. (p. 138)

Belkin and Robertson, 1976:

> [Information science] is a problem-oriented discipline concerned with the effective transfer of desired information from human generator to human user, . . . (p. 197)
>
> . . . .
>
> [Information science] is specifically concerned with information in the context of human communication. (p. 198)
>
> . . . .
>
> Its purpose is to facilitate the communication of information between human beings.
>
> . . . .
>
> [It is concerned with] the deliberate (purposeful) structuring of the message by the sender in order to affect the image structure of the recipient. This implies that the sender has knowledge of the recipient's structure. (p. 200)
>
> . . . .

> A text: (in information science) is a collection of signs purposefully structured by a sender with the intention of changing the image-structure of a recipient.
> Information: (in information science) is the structure of any text which is capable of changing the image-structure of a recipient.
> . . . .
> We leave undefined the terms purpose and intention and assume structure to be understood in its most general form as order. (p. 201)
> . . . .
> We can now state that the basic phenomena of information science are the text and its associated information, and the relationship of these to the sender and recipient . . . [and] the image-structures of the sender and recipient. (p. 202)

Farradane, 1976:

> What is called 'information science' has grown out of practical needs: the need to know what has been done; the need to keep up to date; the need to save time and money if something has already been done, or has proved ineffective. Human civilization, as compared with the organization of other animal groups, has been infinitely more successful because man has been able to communicate and record acquired experience, and to transmit it from one generation to another. (p. 91)
> . . . .
> [We] are concerned with human intercommunication which . . . always involves some medium of communication. . . . [We] shall of course be concerned mainly with writing or some other form of more permanent record as the means of transmission. It is important to note that there is a human being . . . at each end of the chain; furthermore, there may be other persons, such as editors, indexers, or computer programmers, who will influence the communication processes and probably distort the communication in varying degree. . . . Information science must . . . include some study of human beings, and in particular their processes of thinking and their behaviour in all actions relating to communication, whether they are the originators, the manipulators, or the recipients of communications. (p. 96)
> . . . .
> The manipulation of the various forms of the representation of thought is the main consideration in communication. We shall need to study all the distortions and errors that can occur, with the aim of eliminating them as far as may be possible by controlling the conditions of communication. This involves all the well-known processes of editing, publication, dissemination, indexing, coding, storing and computer handling. Intermediate human beings are also involved in these processes. The processes are then, so to speak, reversed by the techniques of retrieval until the stage is reached where the medium again becomes some form of stimulus to the mind of the recipient, who converts it back into his thoughts; . . . Furthermore, if intermediate persons are involved, the representations

> concerned in communication are liable to suffer great change, since these persons will behave as recipients who convert the representations to thought and back again into probably modified representations. (p. 99)
>
> . . . .
>
> We shall now no doubt have to live with the term 'information science', but we must make it clear that we shall be studying both knowledge and information and their interconversion. It must also be made clear that the knowledge involved is not only knowledge about the sciences, but probably about any subject. The processes of interconversion involve the problems of meaning, and meaning can now be defined as the relation of the initially produced, or finally transmitted, information to the original thought of a communicator, or to the thought induced in a recipient, respectively. The meaning of the information at intermediate stages of communication may perhaps be studied by introducing an intermediate recipient, who will also become a secondary communicator, but such intermediate treatment obviously introduces a chain of complications. (p. 100)

Kubátová and Fogl, 1976:

> Information science extracts from among the many processes occurring in human society with all its diversity and dynamism of development the process of circulation of specialised information and studies this process--which constitutes one of basic preconditions of the development of society--from the standpoint of optimising processes of decision-making, planning and management. (p. 24)

Roberts, 1976:

> Information work, as practised by intermediaries such as librarians and information specialists, among others, is a communication function within a social context, the facilitation of a social act which, in information jargon, is sometimes misleadingly described as information flow. Out of, and around, the complex of social issues associated with 'information transfer' or 'flow' there has developed a cluster of research and investigative activities, fundamental and applied, which have come to be labelled, loosely, it must be admitted, information science. (p. 249)
>
> . . . .
>
> The complementary activities of theory and practice [in information science] have only one aim, the improvement of the presentation, transfer and use of information. These ends are practical. It is this practicality that gives to information science its significance and meaning, and gives to theory its purpose. (p. 256)

Salton, 1976:

> Information retrieval (IR) is concerned with the structure, analysis, organization, storage, searching, and dissemination of information. An information retrieval system operates on the one hand with a stored collection of information, and on the other with a user population desiring to obtain access to the stored items. (p. 649)

Saracevic, 1976:

> [Information science] has its roots in the problems encountered in scientific communication. (p. 87)
> . . . .
> After World War II information science emerged, which defined the problem as one of providing the scientist with information; thus it developed a concern with relevance, for it was perceived that the "amounts" of nonrelevance endanger communication. Information retrieval systems emerged as information science' "solution" to the scientific communication problem. (p. 88)
> . . . .
> Embedded in the communication of knowledge may be various systems, called information systems, which are aimed at enabling, enhancing, preserving, or extending the communication process. Examples are libraries, IR systems, control and command systems, management information systems, and inquiry systems.
> . . . .
> For a variety of types of communication of knowledge, for a variety of uses, for a variety of conditions and environments, for a variety of desires for effectiveness or efficiency, and for a variety of understandings of what are the information problems--a variety of information systems have been built. (p. 93)

Belkin, 1977:

> [I] will only indicate here the most significant aspects of that . . . communication system specific to the problem of information science (facilitating the effective communication of desired information between human generator and human user), . . . The communication system has two levels of abstraction. The linguistic level of the system
>
> generators ⟶ texts ⟵ recipient
>
> is a representation of the communication system as embodied in documentary form. The cognitive level of the system
>
> states of knowledge ⟶ information ⟵ anomalous state of knowledge
>
> is a representation of the cognitive states underlying that communication system. The significant aspects of this system from our point of view are that it is recipient controlled (or instigated), and that the recipient's instigation is prompted by recognition of an anomalous state of knowledge. (p. 191)

Ghuman, 1977:

> [The] social basis of the organization of knowledge as reflected in documents and in the minds of readers is a potentially vast and fruitful area of study to which we shall have to turn if future developments in documentation are to be more than technical refinements.
>
> . . . .
>
> [Our] basic task is designated 'documentation', and I use this in the broadest possible sense to refer to our handling of documents, i.e. the services we provide. The objective of this is control, a situation in which, to adopt Ranganathan's terms, every reader has access to the books he needs and every book can find its appropriate readers. In this task we are either handling the documents themselves in stores (libraries) or through surrogates representing documents (bibliographies). (Surrogates may be verbal.) In either case (and together they seem to me to be exhaustive) the functions of documentation are basically the same: items are first selected; they are then organized or indexed; subsequently they are retrieved by or on behalf of users and/or actively disseminated to interested parties. A function common to all others and of particular significance throughout documentation is classification. Finally, all services require resources, the acquisition, deployment, and utilization of which I have labelled 'management'. (p. 12)
>
> . . . .
>
> [The] functions of documentation [are] . . . selection, indexing, retrieval, dissemination. . . . (p. 15)
>
> . . . .

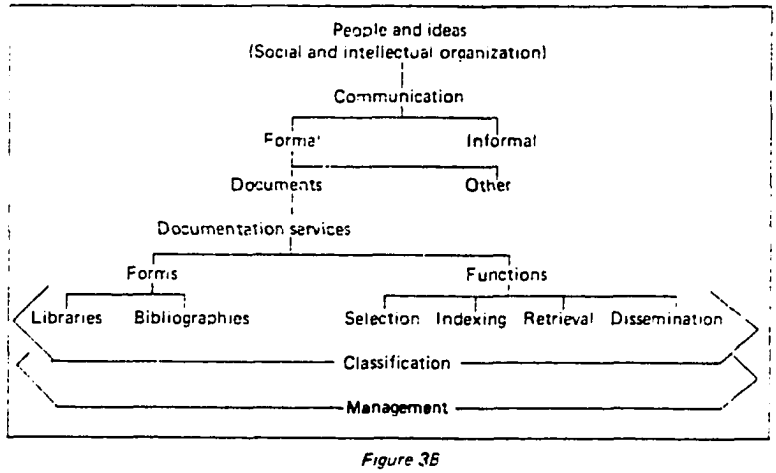


Figure 3B

(p. 15)

Goffman, 1977:

> Information Science, regardless of how it may be defined, must be concerned with the phenomenon of communication, namely the process by which information is conveyed among the members of a population, be they living organisms, devices or some combination of these. (p. 7)

Hillman, 1977:

> Problem-solving knowledge . . . is generated first in the form of a problem statement describing a problem situation. A problem solution will then consist of a plan which, when properly executed, will yield a solution to the problem as stated. This analysis of problem-solving knowledge and its application corresponds very well with a view of information science as a body of prescriptive rules . . . to achieve a desired outcome. It is this interpretation of information science that lends itself so completely to the idea of delivering problem-solving knowledge in response to societal needs, and I shall adopt this prescriptive interpretation in developing a theoretical structure for the transfer of techno-scientific knowledge. (pp. 79-80)
>
> . . . .
>
> The distinguishing aspect of any system, whether of the knowledge transfer or information transfer variety, is the interaction among its various components. We have suggested that enhancing the interactions between various nodes of an information transfer network provides a means for approximating knowledge transfer. Whatever model we choose to represent knowledge transfer must therefore depict various kinds of "knowledge flow" between network components, and be capable of showing how each kind of flow can be controlled, monitored, and promoted by man-machine interactions. (p. 81)
>
> . . . .
>
> [We] have identified four components to be included in the design of a knowledge transfer system, ... They are, respectively, a question-analyzer, an answer determination and delivery component, a database management component, and a collection of data sets. (p. 86)

Kazantseva and Ursul, 1977:

> [Scientific information work's] chief objective is to provide all potential users with reliable information about the latest knowledge, experince, concepts, theories, hypotheses and forecasts created in all spheres of human activity.
>
> . . . .
>
> Informatics is a scientific discipline and its goals differ from those of SIW [scientific information work]. Its objective (as well as that of its subject--the information scientist) is to investigate the laws of SIW, on the one hand--this is the basic, or theorietical, section of informatics--and, on the other hand, to develop optimum ways of practically implementing SIW--this is, as it were, 'applied' informatics. (p. 5)

Kent, 1977:

> [Information science examines] the basic character of the information transfer (communication) process in libraries and other information exchange environments. (p. 132)
>
> . . . .
>
> Lest you believe from these comments that I believe information science is bounded by computers on the north, statistics on the south,

and has not east or west--I would assert that the field must be undergirded with behavior studies--in a major thrust we seek to investigate human behavior in the information seeking mode. (p. 139)

King Research, 1977:

The transfer of scientific and technical information is depicted as a spiral containing a sequence of functions performed by groups of participants. In this view, scientists and engineers are both authors and end users of information. Publishers, libraries, information centers, indexing and abstracting services perform the various functions associated with documentation, dissemination, bibliographic control, storage, and access. Although this model applies particularly to the transfer of printed information, the same functions in combination, or by reordering, also apply to communication in micrographic and electronic forms. (p. 1)

. . . .

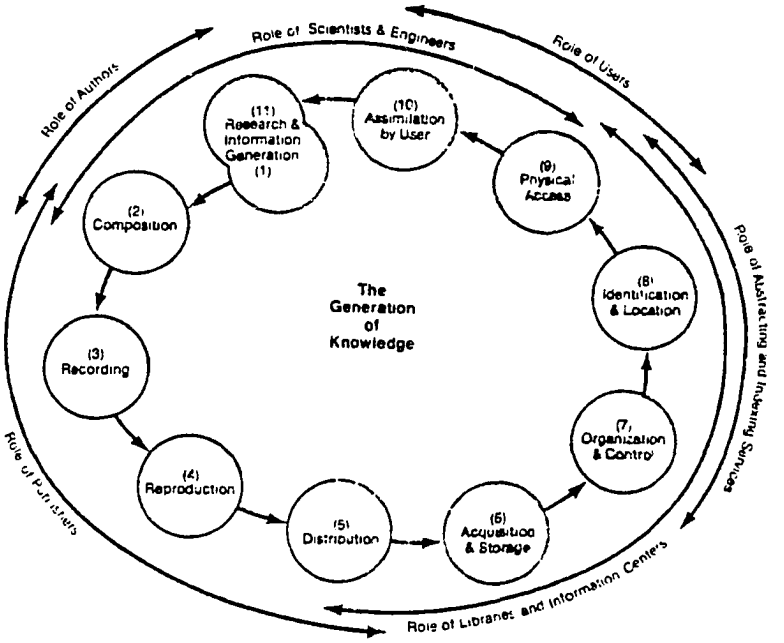


Figure 1
Scientific and technical information transfer model

(p. 1)

Lancaster, 1977:

Through their acquisition and storage policies, libraries provide a permanent archive of scientific achievement and a guaranteed source of access to this record. In addition, libraries, and other information centers, organize and control the scientific literature by means of cataloging, classification, indexing, and related procedures.

. . . .

> Information centers also have "presentation and dissemination" functions in the cycle [of information transfer]. (p. 53)
> . . . .
> The final stage in the cycle . . . is that of assimilation. This, the least tangible, is the stage at which information is absorbed by the scientific community. Here a distinction is being made between document transfer and information transfer. The latter occurs only if a document is studied by a user and its contents are assimilated to the point at which the reader is informed by it (i.e., his state of knowledge on its subject matter is altered). (p. 54)

Meadow, 1977:

> Information science has recently been described . . . as a purposeful science aimed at facilitating the communication of information between human beings. (p. 70)

Roberts, 1977:

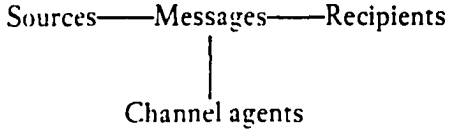
> [Information scientists'] work is distinguished by an overwhelming preoccupation with information and data. The orientation of this preoccupation is entirely purposive. Information and data are related to known individuals and/or well delineated user groups in terms of possible applications, relevance, etc. These tasks are not accomplished simply by the transmission of documents: they frequently demand the manipulation and tailored presentation of data and information. . . . Such activities may well be based upon physical collections of documents, sometimes even called libraries, but, demonstrably, the business of organizing and maintaining such a collection for use is subordinated to the business of facilitating what we loosely know as data and information transfer. It is this commitment to, and active participation in, the information transfer process that distinguishes the information scientist. (p. 557)

Vickery, 1977:

> In the sense used here, information science is the scientific study of the communication of information in society. (p. 1)
> . . . .
> The overall transfer process can be expressed as follows:
>
> (K_S)——M_S——M_C——I——(K_R)
>
> A knowledge source (K_S) emits a message M_S that may be modified on transmission through a channel, to reach the recipient as M_C. From this message the information I is extracted for assimilation into his knowledge structure (K_R). (p. 3)
> . . . .
> To my mind, information science can be regarded as focussed on the channels of informative communication.
> . . . .

[A] channel is the chain of people, machines and documents that lies between the human source which emits a message and the human recipient who assimilates information from it. Consequently, messages as they are recorded in documents are, in my definition, within the channel. . . . Consequently, any intermediary activities between source and recipient come within the scope of the definition.

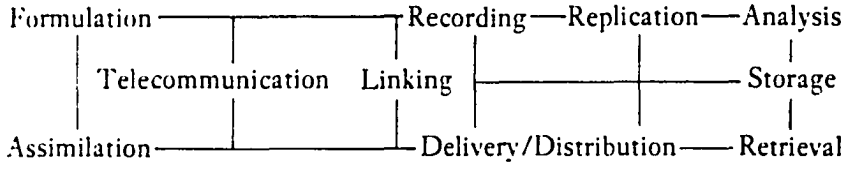
We may represent the situation as follows:



The essential feature of the channel can be characterized as messages in motion. . . . The messages are initiated by S, assimilated by R, and transferred (with or without modification) by intermediary agents, C. (p. 7)

. . . .

To this point, channels of informative communication have been characterized as systems of people, documents and machines that are involved in the transfer of messages. More specifically, there are a number of social functions that together make up the information system. These functions may be broadly summarized as follows:



(p. 12)

Weiss, 1977:

Information science can be defined as that set of principles and prescriptive rules dealing with the organization, maintenance, and management of bodies of scientific, technical, and business information used in decision-making. Information transfer then can be viewed as a communication problem. It is concerned with improving the communication of recorded information among three types of individuals or groups: (1) the originator of information; (2) the processor of information; (3) the user of information. Thus, information science must be an organized body of knowledge based on explanatory principles which seeks to discover and formulate in general terms the conditions under which facts and events relating to the generation, transmission, and use of information occur. (p. 2)

. . . .

Information management refers to efficient bibliographic organization and inventory control. Knowledge management refers to the principles, policies, and practices for guiding and controlling, in a socially and technically optimal sense, the generation, distribution, consumption and effect of this resource [knowledge]. One major, visible result

of this change will be new generations of information systems which will permit interaction between man and stored knowledge, rather than between man and stored document descriptions. Finally, it must be recognized that these systems will operate in a networking environment. (pp. 3-4)

Yovits, Rose, and Abilock, 1977:

The generalized model of information flow is shown to represent virtually any decision situation. (p. 19)

. . . .

In our formulation we treat information to be data of value in decision-making. . . . An implication of this definition then is that information is used only for decision-making and that the decision maker has only the resource of information available to him. Thus, information and decision-making are very closely bound together in our general model. (pp. 20-21)

. . . .

Our general model of information flow and analysis . . . provides a way of looking at any information-decision interaction and defining the role and flow of information in the system. The IAD module (Information Acquisition and Dissemination) processes data for the system. . . . Whenever a decision must be made, the DM module (using all of the data available) establishes the possible course of action and selects the "best" one to execute. The Execution module executes the DM-chosen course of action, according to all pertinent external environmental factors, leading to various outcomes depending on the alternative executed. These outcomes will be some observable quantities. They must be observable in a physical sense if they are to have any effect. The Transformation module takes all observables of the alternative executed and turns these observations into data. These data are fed back into the IAD module and we have come full circule, following the flow of information in the module. (p. 23)

. . . .

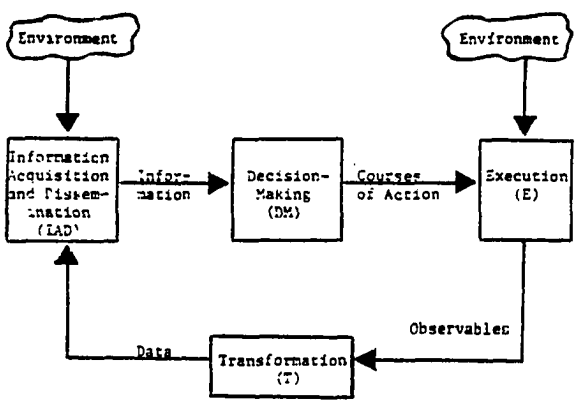


Figure 1: The Generalized Information System Model

(p. 24)

Belkin, 1978:

> [Given] that the scientific model of attaining knowledge is appropriate for information science, formulation of the problem which it wishes to solve is of basic significance. It is through establishment of the problem that the precise area of systematic, scientific investigation can be specified, and the assumptions governing that activity developed. Here . . . I take that problem to be:
>
> facilitating the effective communication of desired information between human generator and human user.
>
> This problem then implies at least the following set of concerns for information science:
>
> 1. with information in human, cognitive communication systems;
> 2. with the relationship between information and generator;
> 3. with the relationship between information and user;
> 4. with the idea of desired information;
> 5. with the effectiveness of information and the effectiveness of information transfer.
>
> The problem of information science as stated . . . and the concerns whcih it implies show that information must be the central phenomenon of interest to information science. (p. 58)

Mikhailov and Gilyarevsky, 1978:

> Thus, while informatics is in some degree historical descendant of library science, the inherited experience has been completely reappraised. By now informatics has by far overstepped the range of problems with which library science is concerned, and is aiming at an overall investigation of the general patterns of all the processes of scientific (scientific only) communication. (p. 132)
>
> . . . .
>
> Scientific-information work is an institutionalised variety of scientific labour which is pursued in order to increase the effectiveness of scientific work proper, and consists in the gathering, analytico-synthetic processing, storage and retrieval of recorded information, and its presentation to scientists and practitioners in a convenient form. (p. 135)
>
> . . . .
>
> Informatics is a scientific discipline which is concerned with the structure and general properties of scientific information, as well as the patterns of all scientific communication processes. (p. 136)
>
> . . . .
>
> The major theoretical tasks of informatics are to reveal the general patterns of scientific information production, transformation, transmission and utilization in the various fields of endeavour. . . . The applied problems of informatics are those of devising more effective approaches to and establishing an optimal scientific communication system both within science and between science and production. (p. 137)

Saunders, 1978:

> In simple and very general terms the concern of information studies is with the transfer of knowledge, or information, or imaginative stimuli from one human mind to another. (p. 17)

Saracevic, 1979:

> Thus one can discern that three directions emerged in information science (or in "informatics" as defined in Eastern Europe):
> (i) professional (applied, practical)--concerned with information systems, services and networks, and information users and uses, as well.
> (ii) technological--concerned with application of information technology to handling of information.
> (iii) scientific (basic)--concerned with theories and experimentation dealing with communication and information and with information systems and processes within systems. (p. 3)
> . . . .
> [The] basic problem addressed in information science is with effectiveness in communication of public knowledge.
> . . . .
> Although information science is in no way restricted to scientific communication alone . . . the problems of scientific communication as interpreted in the 1930s and 1940s were the major impetus for the emergence of information science, for its particular philosophical framework and for the shape of its solutions. (p. 5)
> . . . .
> "Information services for science and technology" was the hallmark of information science in the 1950s and 1960s. The broadening of this original domain in the 1970s is characterized by terms and phrases such as: information services for..."policy", "management", "decision making", "developing countries", "coping with human needs", "neighborhood",...and even in Kochen's conception: for "wisdom". The search is on to formulate a problem domain of information science in the emerging postindustrial society...envisioned to be in relation to management of man's knowledge as a social and national resource. (p. 6)
> . . . .
> Information science was a visible recognition [in the 1960s] of that notion...that indeed there is a possibility to create a scientific dimension to all that transpires in and even more so around information retrieval. (p. 10)
> . . . .
> The ultimate goal (dream?) of basic research in information science is to formulate a general theory of communication, to serve as a theoretical foundation of the science of information. (pp. 10-11)

Debons, King, Mansfield, and Shirey, 1981:

> An information system consists of an acquisition unit to capture data from the environment, a transmission unit to send it for processing or storage, a processing unit to structure the data in

light of user needs, and a utilization unit which is subjected to the process of informing. . . . [An] information system also has a transfer potential in cases where the new information is communicated to another user. (p. 31)

. . . .

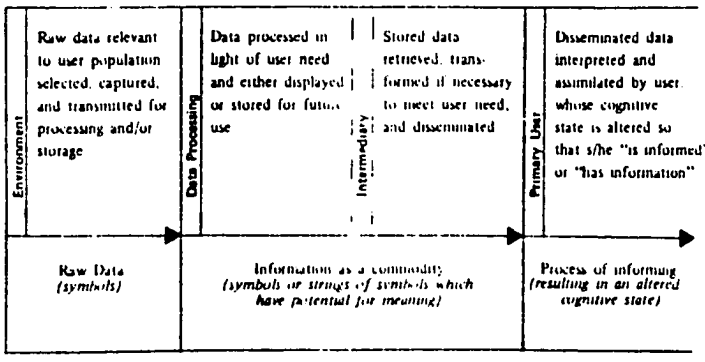


Figure 3. An information system (p. 30)

7.4. Definitions about Objects and People: To process

Weinberg, 1963:

> The information process comprises separate steps or "unit operations": generation, recording and exposition, cataloging, storage and dissemination, retrieval and exploitation by the user. Since the steps are linked in the sense that the later steps depend on the earlier, the entire information process is chainlike; we shall call it the Information Transfer Chain. The first two steps in the chain--generation, and recording and exposition--are performed by the technical man and the organizations that support him, the later steps by the professional documentalists and the organizations that handle information, as well as by the users.
>
> The information chain operates like a switching system. The ultimate aim is to connect the user, quickly and efficiently, to the proper information and to only the proper information. But perfectly precise switching is neither possible nor desirable. One cannot define in advance exactly what information is proper; the switching system must always allow for some browsing in neighboring areas. (p. 13)

Bohnert, 1964:

> Documentalists deal with recorded communication between presumed equals or colleagues in the field of science [and technology]. (p. 50)

Borko, 1965:

> Information science is the theoretical discipline concerned with the applications of mathematics, system design, and other information processing concepts; it is an interdisciplinary science, involving the efforts and skills of librarians, logicians, engineers, mathematicians, and behavioral scientists. (p. 67)

Paisley and Parker, 1965:

> From the persepctive of communication research, information storage and retrieval systems can be thought of as receiver-controlled systems for the communication of information through space and time.
> . . . .
> In the case of receiver-controlled systems involving the selection, possible transformation, and transmission of messages previously deposited in the system, there are more constraints [than in source-controlled communication systems].
> . . . .
> Except in the rare and uninteresting special case where the receiver can examine the entire contents of the system, there must be a means by which the receiver can scan the system and select some subset of the total set of possible messages. The problems of adequately indexing or abstracting a larger file of information are many.
> . . . .
> The ultimate criterion for evaluation of receiver-controlled communication systems ought to be receiver satisfaction. (p. 23)
> . . . .
> We view an information storage and retrieval system as a link in a larger communication system connecting an original source with an ultimate receiver. Such a link becomes necessary when the amount of information in the larger system is greater than the information-processing capacity of the receiver and when, for whatever reason, it is desirable to have the ultimate receiver determine at least in part what messages he chooses to receive or in what form he chooses to receive them. (p. 24)

Hayes, 1967:

> The impact of mechanization over the last twenty years and its continued extension into more and more speculative areas of application have led to theories about different issues in the handling of information and to methods developed for implementing information systems. . . . Thus, for some time, information systems have been approached in a piecemeal fashion, with emphasis given

to one aspect or another--development of vocabularies or classification schemes; design of mechanical devices; studies of user needs; etc. . . .

Part of the difficulty in doing this [presenting a unified picture of information system analysis and design in the context of a total systems approach] is the lack of definition of what constitutes an 'information system.' Various systems differ in the level of detail they provide--from references to abstracts to full content. They differ in the degree of complexity of the data itself--from numbers to words to concepts. They differ in the level of data processing they provide--from mere transmission, to selection or retrieval, to reduction and organization, to analysis and concept recognition. They differ in the degree of formalization--from highly controlled and organized classifications to natural language text. . . . (p. 105)

. . . .

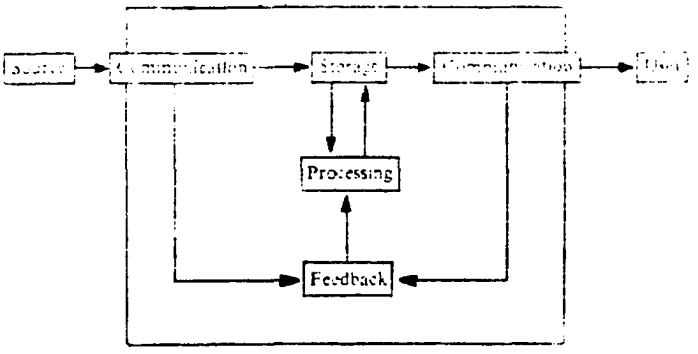
[The term information systems is used] in as general a sense as possible, encompassing both well-defined, almost classical systems (such as inventory control or accounting systems in business) and very ill-defined systems (such as those for 'content retrieval') from documents). However, the problem in information systems design . . . are those involved in transforming ill-defined situations into well-defined ones. Our emphasis, therefore, must be on the more complex end of the spectrum of information systems. In this respect, it is important to recognize that the problems of definition are in fact the characterizing ones of information science, and that they are present to some extent in every information system. (p. 106)

. . . .

There are well-established definitions of both a structural and a functional nature for characterizing types of information systems. Perhaps the most general picture is that provided by Figure 1. As it shows, a system is a configuration of components which can be considered as 'communication', 'storage', 'processing', and 'feedback'. Particularly significant for their effect on system operation are the other two factors shown, 'source' and 'user'. (p. 107)

. . . .

Figure 1



(p. 106)

Weisman, 1967:

> Documentation is a well established term in Europe, where it has been commonly used for a number of decades to refer to the literature of science and its handling in all its forms. (p. 8)

Penland, 1969:

> Information science . . . establishes indexing rules for many-to-one transformations whereby indexers may recommend reductions of information that will serve as a guide to the user in searching a file at a faster rate.
>
> . . . .
>
> Information science, concerned as it is with the transformation and reduction of message content for indexing purposes, compresses ordinary language in order to discover an organization of symbols and modulations within context of the thesaurus. (p. 478)
>
> . . . .
>
> Information science uses content analysis for its potential ability to control knowledge growth, as well as to transfer information based on retrieval strategies and indexing efficacy. Information science endeavors to organize the connotative and denotative aspects of language. (pp. 479-480)
>
> . . . .
>
> Communications retrieval systems provide, on demand with maximum precision, information relevant to questions posed by individuals. In this receiver initiated communication there is a one-to-many mapping in a direction opposite to that of the more familiar communications sender system. The receiver interrogates many sources, some or all of whom presumably could yield the necessary information. However, in most instances, the interrogator does not use the entire message of any one sender and he may not find his desired information in any one source but only as a product of all sources consulted. This model of communication has a considerably different pattern from that of the traditional sender-receiver model. This model is concerned with question coding when working with a patron and message coding when indexing documents in preparation for service to patrons seeking information. (p. 477)
>
> . . . .
>
> In information retrieval, content labels or descriptions, and abstracts are employed by the inquiry-negotiator to locate those portions of many communications messages relevant to the patron-initiated inquiry.
>
> . . . .
>
> Retrieval communication is concerned with the transfer of information as requested by an individual who interrogates documents. He wants to receive such information (selected from various senders) as will determine, or modulate, to his satisfaction some anticipated personal activity or cognitive state. (p. 479)

Rice, 1969:

> Many believe that the processing of "information" is the central theme of computer science. Others believe that this is not the case even though they recognize information processing as an important area. The difference of opinion arises not so much from the facts as from the interpretation of the words "information processing."
>
> If we take a broad interpretation, we could include such things as:
>
> 1. The execution of algorithms. We take the information about how to solve a problem or accomplish a task and act upon it.
> 2. Language translation and programming. We take the information expressed in one language . . . and reexpress it in another. . . .
> 3. Problem solving. We take the information (both specific facts and theory) about a problem and manipulate it until we obtain the required information about the solution of the problem. (p. 195)
>
> . . . .
>
> However, if we take a narrow interpretation, then we would not include the three items above. We would interpret "information processing" to be concerned with the manipulation of more "specific" facts. This is sometimes called data processing. We would include such things as:
>
> 1. Sorting and classifying. . . .
> 2. Ordering and merging. . . .
> 3. Correlating. . . .
>
> It is not really important which of these interpretations we choose. (p. 196)

Salton, 1969:

> Information science deals with the problems of information handling in the modern world. It is concerned with the structure and properties of information items, the techniques for information handling, the characteristics of information processing devices, and the design and operation of information handling systems.
>
> The main information handling operations are the production and collection of information items, starting with their initial generation; the analysis and transformation of information, including editing, printing, and/or publishing, as well as indexing, cataloging, abstracting, and summarizing of information; the organization and storage of information, including classification and deposit in data banks, libraries, and information repositories; the encoding and transmission of information from originating points to desired destinations; and finally, the retrieval of information in response to information requests, and the dissemination of the retrieved data. (p. 111)

Yovits, 1969:

> [The model of the generalized information] system is comprised of four essential functions. There is an Information Acquisition and Dissemination function (IAD), a Decision Making function (DM), an Execution function (E), and a Transformation function (T). As has been pointed out, virtually all situations involving the flow of information can be described by this model. These situations would include the use of information by the research scientist or the development engineer, management of a large corporation, command and control of a military engagement, or such relatively straightforward and simple activities as the switching on or off of a thermostat-furnace system.
>
> . . . .
>
> Each function is seen to collect, store, operate, and disseminate. (p. 372)

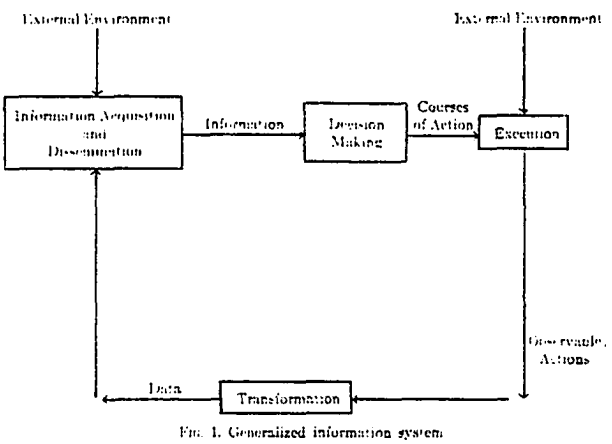


Fig. 1. Generalized information system

(p. 372)

Belzer, 1970:

> Information systems deals with the design and testing of systems for a specific purpose, or use, in handling information. Collection, reduction, organization, storage, transmission, and dissemination are components that must be integrated into a system.
>
> Information service is concerned with providing service to many users of information centers. (p. 271)

Otten and Debons, 1970:

> The fundamental nature of information per se can also be demonstrated by the processes of information transmission or communications in general. Any transmission link can, in principle, be used to transmit every kind of information. A communication channel provides the means for the transmission of information. This

involves the transmission of a physical signal. However, this signal can be used to convey any form of information. For example, it can convey information expressed in the language of computers, information in the form of speech, of graphics, or even of motion pictures (TV). The operations performed in transmitting the various physical representations of information are one and the same; . . . (p. 90)

. . . .

Information is generated, processed, and used by men. If machines are involved in handling information, these machines generate, process and use information under the control by man and for man. (p. 92)

Yovits and Ernst, 1970:

Information Science has been defined in terms of the study of information flow in the Generalized Information System. (p. 26)

. . . .

The system is comprised of four essential functions. There is an Information Acquisition and Dissemination function (IAD), a Decision-Making function (DM), an Execution function (E), and a Transformation function (T). It is suggested that most situations involving the flow of information can be described by the model. These situations would include the use of information by the research scientist or the development engineer, management of a large corporation, command and control of a military engagement, or relatively straightforward and simple activities, such as the switching on or off of a thermostat-furnace system. (p. 3)

. . . .

Each function is assumed to collect, store, operate, and disseminate.

. . . .

In any realizable and operational system all the indicated functions must be present.

. . . .

In particular, the DM function is a most important one and may be established as the key consideration in the entire information flow process. For present purposes, the DM function represents any system component accepting an input from the IAD and providing an output to E. The DM may be an individual or organization (man-man system), a man-machine, or machine system. In any of these cases the DM transforms information into observable actions. The input to the DM is information, some of which may be stored or "held in memory." (p. 4)

. . . .

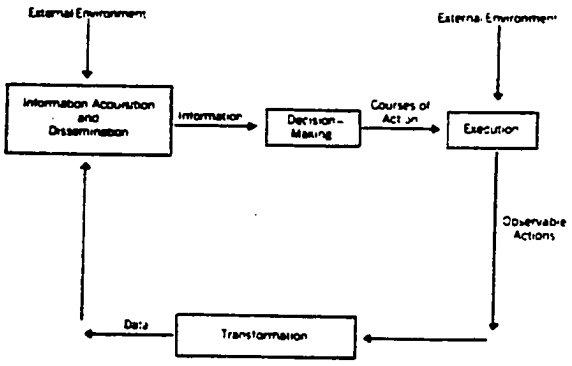


Fig 1 Generalized Information System

(p. 4)

Arntz, 1971:

> ["Scientific documentalists": scientists from another sphere who, through a comparatively short training in documentation, have acquired the ability to handle the user profiles of their particular branch. (p. 59)
>
> . . . .
>
> [Informatics:] used as a collective term for all the knowledge that is required for the effective operation of these highly specialized mechanical techniques--including the high expenditure of effort embodied in the word "programming". (p. 61)

Debons, 1971:

> The term information system science has arisen in respect to the application of systems theory to the design of command and control systems. (p. 363)
>
> . . . .
>
> [The] science of information would ultimately be the basic science of the information sciences.
>
> The phenomenon of information is the most pervasive in human endeavor, and a matter germane to his development and survival; . . . With further developments in information technology, our understanding of information will gain further importance.
>
> The experience and research engaged on behalf of command and control systems can provide the base for the development of theories regarding the transformations that underlie the acquisition, transmission, processing and depiction, and use of data. (p. 369)

Forino, 1971:

> A first possibility is to consider information science in a rather strict sense as roughly equivalent to "documentation science", i.e. as:
>
> "the body of knowledge concerned with the technologies for information transfer in science and technology" that "includes besides librarianship and information work (as a professional),

some more modern branches such as linguistic analysis, computer science, etc. as applied to information transfer" (UNISIST Glossary).

A much broader approach can also be taken. It consists in considering the concept of information in its widest sense, and including within the subject matter of information science the study of all parts of linguistic and non-linguistic communication, as well as the study of natural and artificial devices capable of producing, storing, transmitting and utilizing information, and, in particular, giving special consideration to the study of the human and social uses of information.

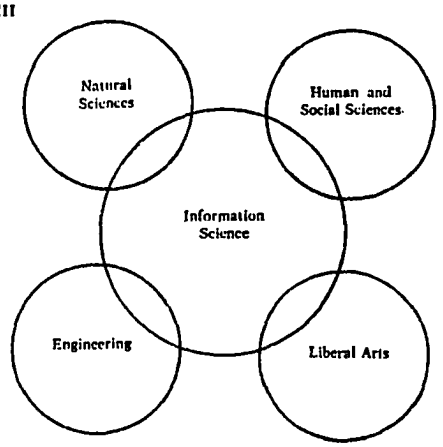
These two approaches . . . both appear unsatisfactory. The first one because it takes into account only one, even if the most important, aspect of the information world, i.e. documentation, and would exclude many other people who at the professional level are indeed working in the information field and in particular on the design, implementation and management of conventional or computerized information systems. The second one because it is really too broad for practical purposes. (p. 75)

. . . .

[The] central core of information science . . . [includes] all items concerned with the structure and properties of information-handling systems and devices. (p. 76)

. . . .

DIAGRAM III



(p. 79)

Rózsa, 1971:

Scientific information is a subordinate concept of the intellectual communication system of society. The special significance of information on special literature within the intellectual communication system of society largely depends on time, subject field and on the purpose of applications. (p. 371)

. . . .

[It] is necessary to introduce between the researcher and the information processes a new communication link which could be referred to, as is now the practice in specialized literature, as "information officer".

. . . .

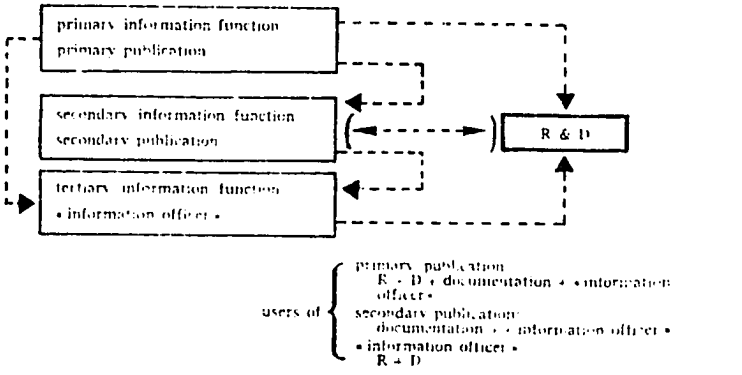
We might introduce a "tertiary" information function with the role of "information officer" who would analyze, on a level with researchers, documentary publication (abstracts, bibliographies, etc.) and notably bring to the attention of individual researchers, material which is relevant to their research. . . . The present maximum of the processing work of documentation would be the minimum of the "information officer's" processing work: apart from producing subject-syntheses it would not be concerned with the processing of primary literature (making abstracts, bibliographies, etc.). To put it another way, the work of the "information officer" begins where that of the documentalist ends. . . . This type of activity would be really an organic part of the research process, one of its effective elements. (pp. 373-374)

. . . .

The tertiary information function could not be done by any library or documentation centre, because their regular activities are oriented to the scientific community as a whole (in a branch of science) and not to individual researchers. (p. 375)

. . . .

THE SCHEME OF THE FLOW OF INFORMATION WITH «INFORMATION OFFICER»



(p. 374)

Veenhuis, 1971:

It is argued that informatics is more than computer information: applied informatics must cover human aspects of information, collaborating with psychologists and sociologists. Fundamental informatics must encompass the "system" concept and thus enter areas hitherto not associated with computer users. (p. 332)

. . . .

Since 1967, when the International Federation for Information Processing, IFIP, approved the constitution of its subset: the IFIP Administrative Data Processing Group, IAG, the term 'business data processing' has generally been replaced by the more exact term 'administrative information processing'. The field of the documentation and information science, and especially information retrieval, can be considered to be administrative data processing.

. . . .

The conclusion can be that there is less difference between "scientific computing" and "administrative data processing". (p. 333)

Yovits and Mathis, 1971:

> [We] consider information science to be a broad discipline concerned with the generalized study of information flow. Information is defined as data of value in decision making and a "generalized information system" of virtually universal applicability is accordingly established. We then define computer and information science to be the study of information processing and information flow in this generalized system. (p. 118)

Ashenhurst, 1972:

> The information systems available to those in charge of operating and directing organizational activities must keep pace with these trends [towards organizational growth, complexity, diversity of operations, extensive reporting requirements, difficult planning, narrowing time constraints, increasing labor costs]. Information systems have always existed in organizations, and with the advent of computer techniques their operation has become a highly technical subject. As a result, information processing activities are becoming institutionalized within organizations.
>
> . . . .
>
> As the relationship of information systems to managerial effectiveness becomes more obvious, organizations come to consider the capital needed for future development of information systems as an investment in their management capacity. This gives rise to an information systems planning activity. (p. 365)
>
> . . . .
>
> Information systems in organizations can exist on several levels. On the operational level, an information system can be an integral part of actions and transactions which take place on a time scale measured in seconds, minutes, or hours. On the control level, an information system may function to give line managers a summary picture of an operating unit or group of units over intervals measured in days or weeks. On the planning level, an information system may serve to indicate trends over months or years, providing top management with the basis for determining major policies and directions. There is some controversy about the relative ultimate importance of information systems at these various levels, . . . (p. 366)

Chernyi, 1972:

> An integrated information system should be distinguished from what is called an "information bank" (or (data bank"). An "information bank" here implies a computer-based information system whose main function is to cater to the information needs of scientists and practical specialists using ready-made research files supplied to that system by one or more integrated information systems. As a general rule, the "information bank" itself performs no analytical or synthetic processing of the documentary sources of scientific and technical information.

. . . .

We thus come to the concept of an integrated information system (IIS), . . designed on the basis of the principle of one-time exhaustive analytical-synthetic processing of each document . . . and followed by one-time input of the results of that processing into the computer, for the subsequent repeated and multiple utilization of these results--for selective dissemination of information, preparation of required secondary publications, as well as retrospective search of documents and information. In other words, IIS "packages" information materials according to the types of information needs. The word "one-time" does not imply that at the IIS input each document is completely processed by one specialist. It only means that the processing fully excludes any duplication of intellectual efforts: it is permissible to enter into the computer only such information items that have not been previously entered into it and cannot be directly obtained or derived from those already stored. (p. 181)

. . . .

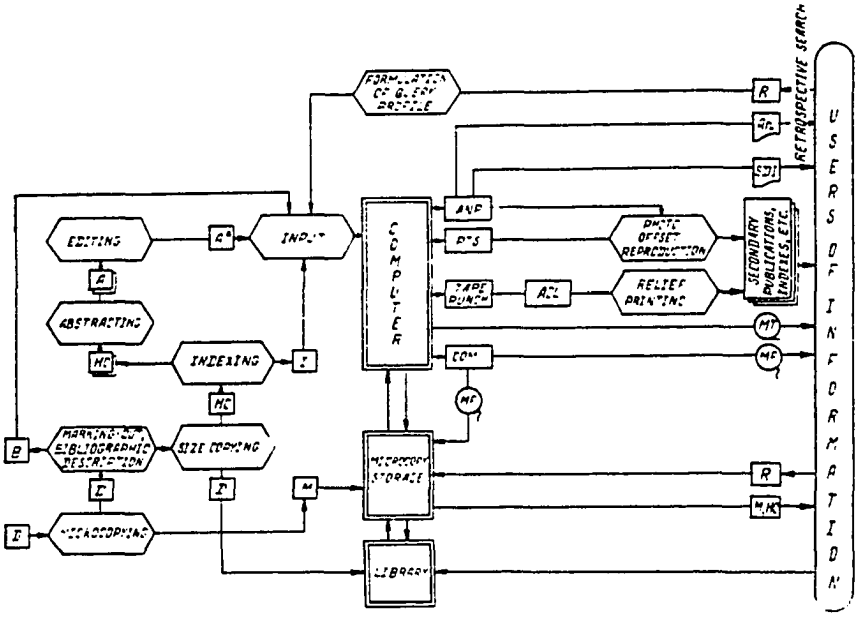


Fig 3 Schematic block-diagram of integrated information system

Abbreviations used

A—form with document abstract
A*—form with edited document abstract
An—answer
B—form with bibliographic description and subject heading numbers of the document
ACL—automatically controlled linotype
ANP—alphanumeric line printer
COM—computer output microfilm unit
D—input periodical, patent specification, etc
HC—hard copy of document
I—form with subject heading numbers of a document marked—out, and keywords indexing that document
M—document microcopy
MF—roll microfilm
MT—magnetic tape
R—request
SDI—selective dissemination of information

(pp. 182-183)

Lancaster, 1972:

> All the complex procedures of information retrieval are directly involved with the manipulation of classes--classes of documents of one kind or another. (p. 1)

Samuelson, 1972:

> As a frame of reference we have presented an action-oriented, result-controlled decision structure representing a time-directed, purposeful thought process which is pragmatic and situation-dependent. The idea is based upon input/output relationships, observation of action and measurement of result, . . . (p. 65)
>
> . . . .
>
> [Information-related universals:]
>
> U: Ultimate objectives and
> G: Goals achivement by
> R: Result from
> A: Action,
> P: Predictive Planning, and
> I: Informative,
> D: Diagnostic
> S: Sensing of
> E: External Environment or Event world. (pp.48, 61)
>
> . . . .
>
> The listed concepts were then used to form a decision sequence (Fig. 2) that can be expressed in a time-directed purposeful order as a series of precedence relationships. (p. 49)
>
> . . . .

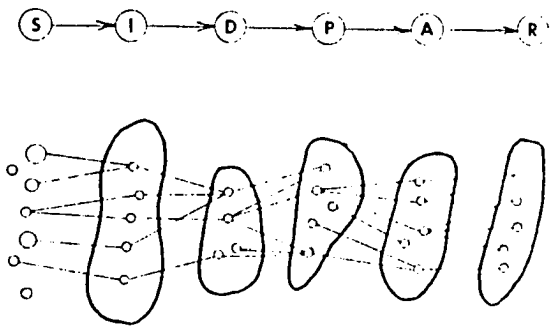


FIG. 2.

S < I < D < P < A < R	Decision sequence
R = f (A, P, D, I)	Function of predecessors
ℙ (G): R (A) A (P) P (D) D (I)	Precedence graph

(p. 50)

. . . .
The fundamental processing structure was also embedded in an overall scheme of goal-directed processing and interaction with E, the external environment of the real event world (Fig. 4). The overall processing is based on feedforward performance and feedback for evaluative measurement as well as learning. I hasten to point out that Fig. 4 only features 15 of the many possible transitions between E, S, I, D, P, A, R, G, U. (p. 50)

Atherton, 1973:

[The] more substantive and more difficult aspects of our world of information science . . . [relate to] the human being who is processing information.
. . . .
We need to ask and try to answer, scientifically, some of the following question:
(1) How do people seek information?
(2) Why do people seek information?
(3) Why do people fail to seek information?
(4) Do different types of people seek information in different ways, and if so, how can information systems be designed to suit different types of clientele?
(5) How do people process information?
In trying to handle these complex questions, we may have to discard much of the methodology most prevalent in the field today. Inadvertently, perhaps, we have ignored the nearly invisible social processes which affect our work the msot, human information processing. (p. 672)

Langefors, 1973:

Information systems handle data to provide information. An information that any user in the whole system might find useful.-- Provided he is authorized to use them. (p. 11)
. . . .
By information system we mean here: A system of information sets needed for decision and signalling in a larger system (of which it is a subsystem) containing subsystems for
collecting
storing
processing
distributing
information sets.
Notice that decision processes are examples of information processes, whether performed by man or by machine. Also most information processes contain decision processes. Thus, the set of decisions in an organization is a part of its information system. (p. 195)

Marzocco, 1973:

> [The] concern of the information scientist is not with all [human] behavior, but only with the information-handling part of it. (p. 88)
>
> . . . .
>
> In addition to users, at least four other sets of people can be identified as playing distinct, important roles in relation to information systems. The functions of some of these groups can be seen nicely in a library or information center interpretation of the Shannon communication system model. . . . The Shannon model includes a source, transmitter, channel, receiver, and destination. Looking at a library as a communication system, the part of the source is taken by the authors repsented in the library, while that of the transmitter is taken by publishers and other document-producing organizations. The channel, which connects production functions to consumption functions, becomes for the library the various means of document distribution on the outside as well as acquisition, cataloging, and storage functions carried out inside the library. The receiver in the library interpretation consists of the equipment, procedures, and people comprising the retrieval capability, since these are what it takes to get the "message", the document, to its destination. The destination, of course, is the reader or other user.
>
> . . . .
>
> Two other groups do not contribute directly to the information transmittal process, but they are vitally important to any information system. One consists of the system designers and developers. It is rarely forgotten that information systems are created for people and that they consist largely of people, but it is seldom remembered that they are also put together by people. The last group is seldom considered, despite its tremendous size . . . people who make up a social nexus connecting the system with all the entities and events and people of everyday life. The environment of a system consists not only of things and what things do, but also of people--all the people. (p. 86)

Rózsa, 1973:

> Documentation forms the most mobile part of special literature information. It is concerned with that part of the entire body of knowledge which <u>is subject to 'technical depreciation'</u>, i.e. to redundancy and is characterized by a <u>vast amount of data</u>. (p. 46)
>
> . . . .
>
> Documentation does not exist by itself. It is always the documentation of <u>something</u>, of a branch of science, of a profession, of an art, etc. (pp. 48-49)
>
> . . . .
>
> It appears therefore that whether the traditional or the mechanized information processing is used, it is necessary to introduce between the researcher and the information processor a new communication link, which could be referred to, as it is by now the practice in specialized literature, as an 'information officer'.
>
> . . . .

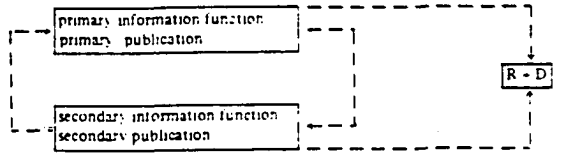
The role of the 'information officer' within an institute or research unit would be to analyse regularly and on par with the level of the research references, bibliographies, abstracts, and in general documentary publications, and notably to bring to the attention of individual researchers material which is relevant to their work. Another effect of the processing of secondary information would be to draw attention to new topics and in this way stimulate research. The present maximum of the processing work of documentation would be the minimum of the 'information officer's' procesing work: apart from producing subject-syntheses it would not be concerned with the processing of the literature. To put it another way: the work of the 'information officer' begins where that of the documentalist ends. What is being considered here is a tertiary information function. (p. 51)

. . . .

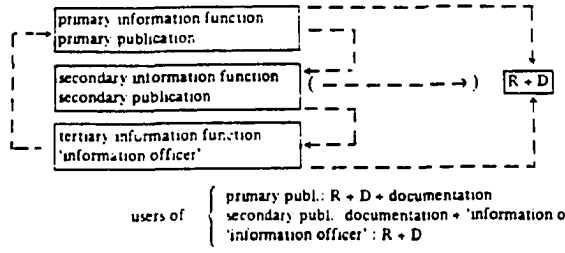
The systematization of the functions of the 'information officer' that is suggested here, is at the same time a conscious formulation of the tendency that the users of documentation are in the first place information specialists and not researchers. (p. 52)

. . . .

The schema of the flow of information



The schema of the flow of information with 'information officer'



(p. 52)

Otten, 1973:

We define a system as the recipient of "information". A system can be any information-processing structure, living or man-made: computer, living organism, man himself or an organization. "Information" may be regarded as what is needed for the control and proper functioning of a physical system in its environment that functions in the pursuit of its goals, including its survival. (p. 127)

Tague and Carroll, 1973:

> If the information scientist, then, is seen as a middleman or purveyor of information, what is he providing?
>
> . . . .
>
> The information scientist must learn to identify the true information needs of our total society, not just those of a small, inbred group. He must learn to cope with dynamic rather than static information needs.
>
> . . . .
>
> In many schools, information science and science information are synonymous. (p. 41)
>
> . . . .
>
> Information scientists must be trained to identify and characterize all the different information-seeking user sets--what one might call the receiver sets. Given these, they can then identify and characterize the sources actual and potential, which could satisfy these users--the generator sets. Also, the information scientists need to learn how to develop the mappings and transformations which will provide to the users the information they need in a form they can use--the transmitter sets. Information science began with the Shannon model, but abandoned it. Perhaps the time is ripe for a re-examination and elaboration in terms of the total concept of information. (pp. 41-42)

Belkin, 1974:

> [The] basic phenomenon of interest to informatics is information considered in the special sense and context of a human social system concerned with changes in states of knowledge. Furthermore, informatics is especially concerned with the relationship between knowledge and information. (p. 76)
>
> . . . .
>
> [If] we aspire to "scientific" status for informatics, we must begin by developing a common concept of information. (p. 77)
>
> . . . .
>
> Thus, the fundamental definitional requirement . . . is that it must refer specifically to information within the domain of scholarly information activities. . . . Beyond this fundamental requirement, the definition of informatics requires that information be considered as a social communication process, that such communication be seen as purposeful, i.e., that information is requested or needed, and that the effect of information on its recipient be accounted for. (p. 78)
>
> . . . .
>
> [Information] for informatics can be considered as specifically structured data which act to transform a state of knowledge (or knowledge structure). In this context, B.C. Brookes' "fundamental equation" is rewritten:
>
> $$\text{Data} \xrightarrow{\text{Cognition}} H_D;\ H_D * S^i_n \longrightarrow S^i_{n+1} \ldots$$

where H_D is the information function appropriate to the set of data; * indicates an operation; S^i is a state of knowledge. The equation reads: (partially structured) data undergo the processes of cognition, yielding a specific data structure called the information function of the data. The information function operates on the recipient's state of knowledge, transforming it into a new state of knowledge. . . .

The data are physical symbols which represent a purposeful communication. . . . .

Cognition is here defined as the process of perception or recognition of the data, selection (if necessary) of the structure appropriate to the data, and mapping of the data elements into that structure, yielding the information function. (p. 82)

Brookes, 1974:

At present information science as practised concerns itself with the domain of documentary scientific and technical information. A typical information system collects the documentary sources of information relevant to its interests, identifies, abstracts and indexes the items it selects, and then organises this bibliographic information, by computer or otherwise, in many kinds of different ways to simplify the problems of retrieval for many kinds of users. Thus we are professionally concerned with the relation between information and knowledge.

The term knowledge is commonly understood to apply to a summation of items of information which have been integrated to form an organised coherent structure. . . . [It] is applied to the cumulated, organised body of information that any human can hope to acquire by learning.

If we try to express this relationship between information and knowledge in a symbolic way, we might write it thus:-

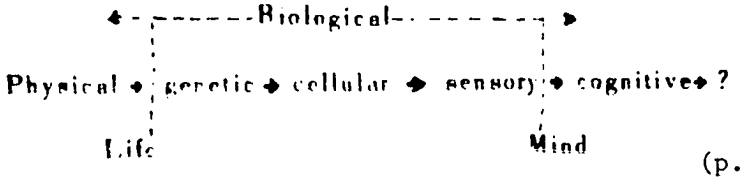
$$I = (S) \quad (S + S) \ldots$$

In this fundamental equation, I is an increment of information which, when 'added to' the 'knowledge structure' (S), modifies that structure to become (S+ S). (p. 116)

. . . .

It is better that we recognise that our fellow scientists who are studying information systems in which the transmissions are not documentary or cognitive, but biochemical or neural, are working at our side rather than in wholly separate fields.

In fact I regard those levels I specified earlier not as sharply distinguishable fields with firm exclusive boundaries but more as a continusous spectrum of information processes.



(p. 119)

Debons and Montgomery, 1974:

> The distinctions between "data" and "information" have a distinct influence on the nature of information systems. Data can be considered as coded signals received from the external world by an acquisition subsystem (e.g., the eye, the ear, radar). Transformations of the data result in what we generally refer to as "information." The transformations can be undertaken by mechanical systems (such as computers and displays), or biological systems (e.g., the central nervous system). In either case the difference between data and information is postulated on the assumption that processes occur that change the state of the receiving agent (e.g., a person is "informed," or a machine has "information"). (p. 26)
>
> . . . .
>
> Information systems are environments composed of people, equipment, and procedures organized to achieve specific information objectives. . . . The objectives of an information system may be seen as the acquisition, processing, and dissemination of data (such as documents). Another major objective may be to aid in communication or in the decision function. Assuming that information systems are established to serve man in his attempt to deal with the external world, an information system can actually be said to have multiple, interlinked functions: the generation of information from data, the facilitation of the use of data or information for action selection, and the transfer of data or information to other systems or to people. (pp. 26-27)
>
> . . . .
>
> Document transfer systems are essentially environments that deal with the physical product of the information generation process. The document is a commodity where the acquisition, processing (cataloging, indexing), and dissemination functions depend on logistical as well as marketing principles. . . . Data access systems are collections of man-machine operations and technologies directed mainly to the acquisition, manipulation, and delivery of coded signals such as alphanumeric displays. Some information retrieval systems are data-access systems, while others are explicitly document-transfer oriented. Management information systems are environments of man-machine arrangemnts and procedures that are directed at augmenting human capabilities in dealing with planning, operational, and control data. (p. 27)

Horton, 1974:

> The information scientist is concerned with identifying and locating information resources, acquiring information and structuring intelligible reference tools so that the resources may be located efficiently to answer general inquiries or specific requests. Or, information may be directed, when acquired, to those users having an interest in the subject content. There is also both a hardware and a software dimension in information science. (pp. 6-7)
>
> . . . .
>
> The middle step in the information chain is often referred to as handling or processing. It is also sometimes called information transfer. This step occurs between information generation and

information use. Between the time an item of information is first generated at its origin point, and the time a user acts upon it, information may pass through a very large number of intermediate stages, each of which may cause both its form and content to be altered significantly. The transformation of data into information is usually, but not always, one of the first steps in the information processing cycle. (p. 43)

Kochen, 1974:

We conceptualize the knowledge system into which an IR system is implanted to consist of three kinds of component parts: (a) people in their role as information-processors, (b) documents in their role as carriers of information, and (c) topics as representations. (p. 15)

. . . .

In this context [of IR systems] we study people only in their role of processing information connected with the production and utilization of documents. The reader and the author, as people, are, of course, the most important links in the entire system. . . . Let us call them information-processing agents, or just agents. (p. 27)

. . . .

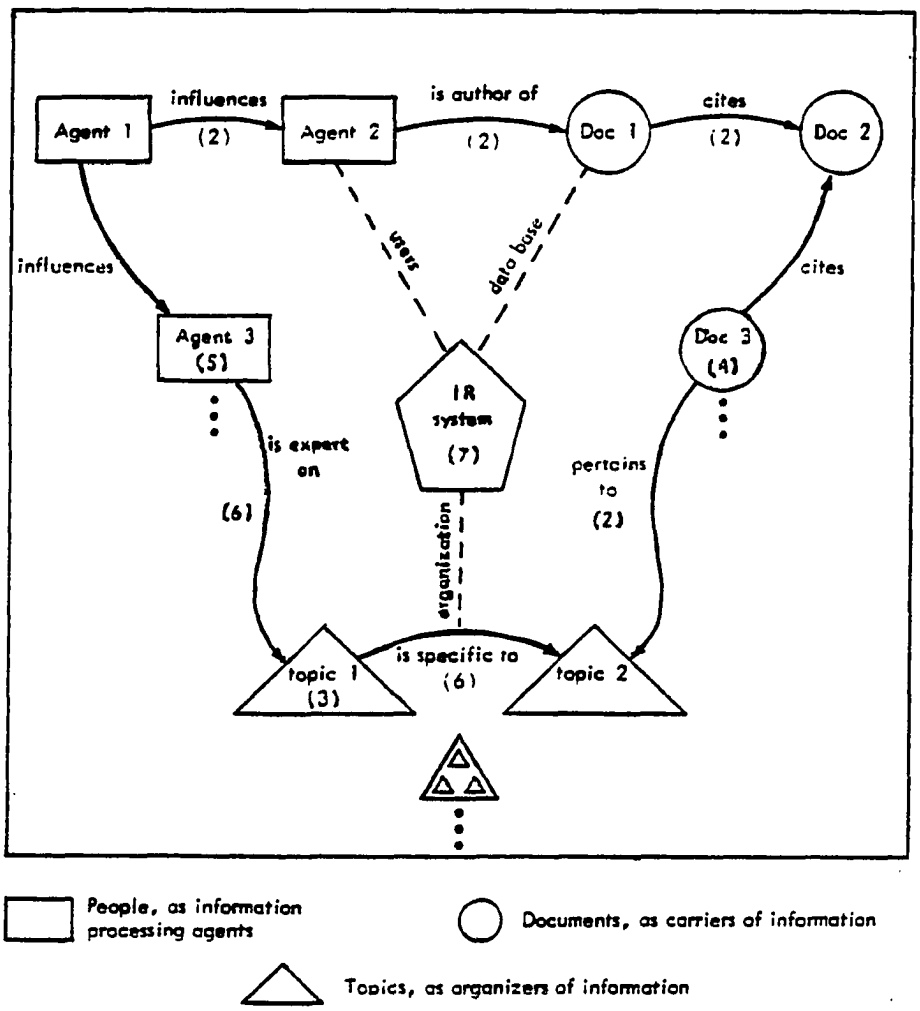


Figure 1.1. Conceptualization of knowledge system. (p. 13)

Kochen, 1974a:

> Concern with the processes of acquiring, accumulating, organizing, and using knowledge is of ancient origin. Insofar as these are central concerns of information science, we could say that information science has its roots in antiquity, except that these concerns were not pursued with the scientific method until a few decades ago. (p. 4)
> . . . .
> The central intellectual concern of information is to explicate the dynamics underlying the growth of literature. (p. 8)
> . . .
> Our central concept of the mechanisms underlying literature growth follows. Three main elements are involved: 1) entities which record documented knowledge, e.g., documents; (Following C. W. Churchman, we regard knowledge as information which is interpreted with a point of view.) 2) entities for processing information, e.g., authors and readers of documents who add to or who use knowledge; 3) entities which represent a topic, such as the prevalent paradigm of a field of knowledge. These three kinds of entities are coupled in various ways, and the totality of all their interrelations changes with time. (p. 9)
> . . . .
> We are currently witnessing a revolution in thinking about the nervous system. Viewing it as a chemical information processing system is increasingly popular. These advances in neuro-biochemistry plus the analogies and insights suggested by life scientists appear to have increasing influence on the development of concepts for information science.
> "Scientific knowledge grows like an organic tree, not as a compilation of collector's items," said the eminent biologist, P. Weiss. He pursued this analogy quite seriously, to the point of looking for analogs of metabolism in the dynamics of information systems. This injects a far more stimulating and profound conceptual input into information science than did the more prosaic analyses of information systems engineers, documentalists, and library systems analysts. (p. 6)

Merta, 1974:

> [The] most general approach [to defining the universe of discourse of informatics or information science] . . . reflects all basic kinds of information, "physical, biological and social information" and studies their origin, transfer processing and, influence wtihin all kinds of physical, biological or social systems with which the given set of information is associated. (p. 260)

Smith, 1974:

> Briefly, Information Science is concerned with how man communicates with man. It is the study of how information is transferred--from the point of generation to the point of use--and

> all the intermediate steps of collecting, organizing, interpreting, storing, retrieving, disseminating and transforming information. As a discipline, Information Science stresses the application of modern technologies to the handling of information. (p. 78)
>
> . . . .
>
> As information scientists we are concerned about the large investment necessary to develop information utilities that permit economical on-demand access to information. . . . We are concerned about the effects and impact of information technology on the culture of our people. (p. 80)
>
> . . . .
>
> The focus of information activities and programs must be redirected from concern with document handling to the needs of the user. (p. 81)

Doyle, 1975:

> "Processing" can be thought of as a family of operations, each of which acts uniformly on every item of information presented, and includes the idea of having the items in a place available and in a form available for ultimate use. "Retrieval," also in a broad sense, suggests all processes that are selective in nature; this--the case can be made--would even include the process of reading, for the mind is very selective indeed in extracting information from the printed page. (p. 16)
>
> . . . .
>
> What makes up an information system depends on what information is and what a system is. In classic information theory terms, information is comprised of symbols which, when broadcast by some sender, have the capability to reduce the uncertainty in the mind of some listener. Of chief interest to students of information retrieval is that information may be preserved as well as communicated. This can function as the basis of a distinction between an information system and a communication system. A mere communication system need provide only for the transmission of information (and not necessarily two-way transmission). It appears to be the custom, however, to require an information system to deal with both the preservation and transmission aspects of information, and we subscribe to that notion.
>
> . . . .
>
> Figure 7.1 is a highly generalized diagram of an information system . . . conceived of as a front half (input) and a back half (output). Information units flow from left to right in the diagram (solid arrows), and these units, previously referred to as messages, are more aptly called documents when they are to be retained in store for potential future recipients, who, in their turn, are more commonly referred to as users of documents. (p. 190)
>
> . . . .

. . . .

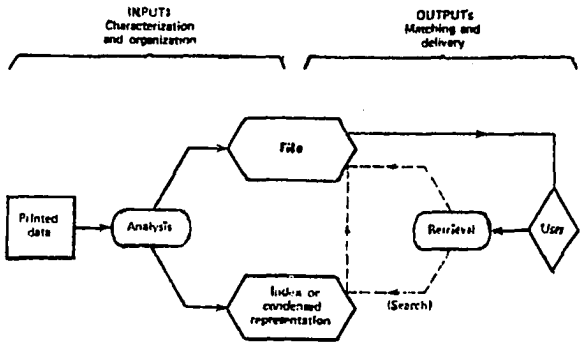


Figure 7.1. The information framework.

Fry, 1975:

> Efficient information processing and management has information storage and retrieval as a major component but includes as well the integrated cycle of communication from generation to utilization. (p. i)

Peters, 1975:

> Documentation. (1) The systematic collection, classification, recording, storage, and dissemination of specialized information, generally of a technical or scientific nature. (2) Written description of a computerized system's operating programs and facilities. (p. 54)
>
> . . . .
>
> Information processing. All technical and commerical operations performed by computers. Normally used in a more general sense than the term data processing.
>
> . . . .
>
> Information storage and retrieval (ISR). The process of retrieving documents from a storage place in response to a person's query; this may be a manual operation (e.g., a librarian taking a book off of a shelf in the library) or a machine operation involving a computer, a data base, or other automated records. (p. 85)

Wersig and Seeger, 1975:

> By "information work" we mean all operations undertaken which directly have to do with the /production of information messages for the user/ particularly /acuisition, cataloguing, storage, indexing, abstracting, editing, retrieval, lending services, synthetic information services, re-packaging./
>
> By "information science" we mean all operations being concerned with the analysis, of information systems, their constraints and the rules governing their behavior and the application of their results for design, implementation, management and evaluation of information systems. (p. 25)
>
> . . . .
>
> In general perhaps the domain of information and documentation may be described as follows: Information and documentation activities include

-the communication of data and findings produced in science and technology within science and techology;
-to transfer non-scientific data and findings which are object of scientific and technical work to science and technology;
- this may include to some extent (if rational) even the tranmission of non-scientific data to persons being outside of science and technology (if these data or findings are a bsis to produce data or findings which are needed in science and technology).

. . . .

By doing so the field of "users" is broadened in a drastic way. We have to face the situation that the whole field of information systems in administration, medicine (including hospital information systems), politics, mass communication, education, jurisdiction, military, even perhaps of commerce (banks, air lines etc.) will have to be considered in the next time in close connection with scientific and technological information, ... (p. 16)

. . . .

An "information system" then may be understood as a "system which objectives are to organize communication processes, particularly between human beings, in order to effect optimal information". (pp. 8-9)

. . . .

The objectives direct these operations to fulfil the information needs of the clientele of the system thus enabling the system to transform incoming messages from various sources into output messages being highly capacitated to fulfil the information needs of the clientele. (p. 9)

Simon, 1976:

Information processing might, not inaccurately, be defined as "what computers do."

. . . .

For information to be processed by a computer or by any other information processing system, it must somehow be represented or symbolized. Hence, information processing is essentially synonymous with symbol manipulation, and the entire discussion . . . of symbol manipulation could be readily retitle "information processing."

. . . .

The phrase "information processing" is often used in preference to "computation" or "data processing," to emphasize the generality of computers--the fact that they are in no way limited to manipulating just symbols that designate numbers, but can operate in any domain, numerical or non-numerical, where information is represented in symbolic form. (p. 647)

Slamecka and Ralston, 1976:

The term <u>information science</u> was coined to designate an interdisciplinary field initially concerned with the exponential growth of recorded scientific information.

. . . .

In the 1960s, the thrust of applied information science focused primarily on the handling of bibliographic records and textual information in science and engineering. Two major foci of effort received considerable attention: the study of the communication processes in the communities of science and industry; and the development of techniques and systems for more efficient organization, storage, and dissemination of recorded scientific information. The term "informatics," synonymous with these two directions of effort, was coined in France (informatique) and popularized after its adoption by the USSR and the Soviet bloc countries; . . . (p. 656)

. . . .

More recently, the preoccupation of applied information science with the control of recorded information and communication in the scientific sector has been broadened to encompass concern with information handling in other professions as well: management, education, medicine and health care, government, law, the military, and others. The initial premise of applied information science--that the cost effectiveness of scientific and engineering work can be raised by improving the communication among its practitioners--has been formulated into a broader assumption: that the cost effectiveness of the human information processes which characterize these professions (e.g., problem solving, decision making, learning, etc.), can be significantly improved through their formalization and gradual delegation to symbol processing machines. (pp. 656-657)

Wersig, 1976:

Documentation. The continuous and systematic processing of documents or data, including e.g. location, identification, 'acquisition', analysis, storage, retrieval, circulation and preservation for the specialized information of users. (p. 98)

. . . .

Information transmission system. A 'system' that takes input information and delivers it at the output without change. (p. 151)

. . . .

Information handling. The storing and processing of information and its transmission from the source to the user (excluding creation and use of information). (pp. 98-99)

. . . .

Information transfer. The whole set of processes involved in the transmission of information from its originator to other persons. (p. 80)

Neveling and Wersig, 1977:

In the mid-1940s, the understanding of 'information work' was more or less restricted to the area of science and technology.

. . . .

[Information work] means actually carrying out activities which allow information transfer and require knowledge of the handling of information (excluding all professions which are subsidiary, like pure electronic data processing, pure reprography, etc.). (p. 214)

. . . .

The second activity is information science, that is, developing methods which allow efficient design, construction, and use of information systems as well as the organization of information processes. Here the following specific tasks are envisaged: analysis, design and implementation of information systems (computerized or non-computerized); management of large information systems and information networks; teaching in the field of information and documentation; basic and applied research; consultancy in information problems (information flow); and planning, public administration, policy-making for information and information systems. (pp. 214-215)

. . . .

Information scientists are people who in their work apply principles, experiences, methods and theorems of information science to information phenomena with the ultimate goal of improving information conditiosn, thereby contributing to the body of knowledge of information science. (p. 215)

Shapero, 1977:

If you accept my point of view you must conclude that: 1) a close study of how humans actually deal with information must be the basis for information science; and 2) we should be very careful in trying to impose violent change on people's information-processing practices. Further, it becomes readily apparent that the way humans actually deal with information should be the primary input to our educational, professional, and research efforts. This is different from the usual approach, which starts with the structure of the formal information mechanisms and establishments. (p. 23)

Yovits, Rose, and Abilock, 1977:

The generalized model of information flow is shown to represent virtually any decision situation. (p. 19)

. . . .

Our approach relates information to its effectiveness and thus its use and value.

. . . .

In our formulation we treat information to be <u>data of value in decision-making</u>. . . . An implication of this definition then is that information is used <u>only</u> for decision-making and that the decision maker has <u>only</u> the resource of information available to him. Thus, information and decision-making are very closely bound together in our general model. (pp. 20-21)

. . . .

Our general model of information flow and analysis . . . provides a way of looking at any information-decision interaction and defining the role and flow of information in the system. The IAD module (Information Acquisition and Dissemination) processes data for the system. . . . Whenever a decision must be made, the DM module (using all of the data available) establishes the possible course of action and selects the "best" one to execute. The Execution module executes the DM-chosen course of action, according to all pertinent external environmental factors, leading to various

outcomes depending on the alternative executed. These outcomes will be some observable quantities. They must be observable in a physical sense if they are to have any effect. The Transformation module takes all observables of the alternative executed and turns these observations into data. These data are fed back into the IAD module and we have come full circule, following the flow of information in the module. (p. 23)

. . . .

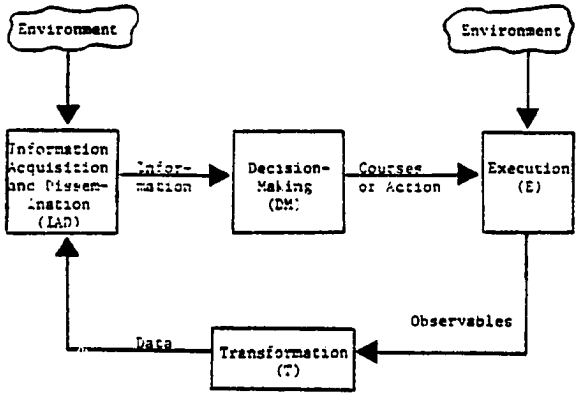


Figure 1: The Generalized Information System Model

(p. 24)

Heilprin, 1979:

> The phrase [information science] recognized some common element or elements in such apparently different activities as library science, abstracting, indexing, cataloging, classification; writing, editing, publishing; photographing and copying, recording, taping; broadcasting, performing; in fact, all aspects of transformation of ideas in communication and computation. These and other activities were seen to be connected by an information function--a communication or articulation between system components by physical and often cognitive and affective means. Thus what happened was a very broad abstraction. And it provides more than a hint of the probable ultimate nature of information science. (p. 24)

Tague, 1979:

> In this article, information science is defined in terms of its use. . . . [It] has at least these four aspects: the application of new technology, especially computers, telecommunications, and nonprint media, to information processing; the application of analytic and quantitative techniques to the development and evaluation of systems and institutions involved with information; principles and systems for the control and organization of information--indexing, abstracting, classification, cataloging; a scientific--i.e., research-based--search for generalizations and laws about information and its use. (p. 90)

Debons, King, Mansfield, and Shirey, 1981:

> An information system consists of an acquisition unit to capture data from the environment, a transmission unit to send it for processing or storage, a processing unit to structure the data in light of user needs, and a utilization unit which is subjected to the process of informing. . . . [An] information system also has a transfer potential in cases where the new information is communicated to another user. (p. 31)

7.5. Definitions about Objects and People: To counsel

Nil additional.

7.6. Definitions about Objects and People: To link

Smith, 1949:

> Documentation's two primary purposes are to facilitate prompt dissemination of live facts among interested persons, and to systematize dead storage for ready resurrection of any wanted fact. . . . Given the necessary funds and personnel, the huge bulk of scientific and technical literature could be placed under effective bibliographic control. . . . (p. 162 in American Documentation 1(August, 1950)

Perry, Kent, and Berry, 1955:

> [However, the] inability to foresee the future imposes limits on what can be accomplished when indexing, classifying or coding information for future retrieval. It is not possible, in short, to link future uses of information directly to the subject content of graphic records. . . . Documentalists can scarcely do more than provide a multiplicity of useful links (or leads) between the information being processed and the currently accepted framework of scientific and technical theory. (p. 247)

Bernier, 1958:

> I consider that information storage and retrieval systems are made up of three components:
> 1. The contributors to the system,
> 2. The media of communication (which in documentation systems consist of a storage element and selectors),
> 3. The users of the system.
> I consider that "environment" includes all three components. (p. 190)

. . . .
The media of interaction in information systems consist of symbols which the contributor and user mutually understand or can be brought to understand, and which can be handled by the media of communication. A documentation system can be defined as a device enabling communication with unknown persons in the indefinite future. The facts that the persons may be unknown, perhaps unborn, and that the time of consulting a given document is unknown lead to problems in the design of successful systems. (p. 197)

Crane and Bernier, 1958:

The documentary systems considered here can be defined as devices for communicating with unknown persons in the indefinite future. The recipients of the information may be unborn when a document is prepared. The specific information that the unknown recipients will select is also unknown. In current idiom, documentary systems are characterized by lack of feedback. (p. 1050)
. . . .
Documentation systems can be considered to be made up of three components: (1) the contributors, (2) the storage element (including selectors), and (3) the users. It is only by interaction among the components that the systems become useful. Because of the delayed nature of the communication involved, there is a minimum of interaction between contributors and users. The interaction is largely confined to that between the storage element and the contributors or the users. (p. 1051)

Fairthorne, 1963:

[The] information sciences are not concerned only with conceptual attributes of the interpretations of signals and symbols, but also with the physical attributes of their production and manipulation. Indeed, the correspondences between the mental use of notions and the physical use of their notations are the raw material of the Information Scientist. (p. 39)

United States President's Science Advisory Committee, 1963:

The information process comprises separate steps or "unit operations": generation, recording and exposition, cataloging, storage and dissemination, retrieval and exploitation by the user. Since the steps are linked in the sense that the later steps depend on the earlier, the entire information process is chainlike; we shall call it the Information Transfer Chain. The first two steps in the chain--generation, and recording and exposition--are performed by the technical man and the organizations that support him, the later steps by the professional documentalists and the organizations that handle information, as well as by the users.
The information chain operates like a switching system. The ultimate aim is to connect the user, quickly and efficiently, to the proper information and to only the proper information.

> But perfectly precise switching is neither possible nor desirable. One cannot define in advance exactly what information is proper; the switching system must always allow for some browsing in neighboring areas. (p. 13)

Paisley and Parker, 1965:

> From the persepctive of communication research, information storage and retrieval systems can be thought of as receiver-controlled systems for the communication of information through space and time.
> . . . .
> In the case of receiver-controlled systems involving the selection, possible transformation, and transmission of messages previously deposited in the system, there are more constraints [than in source-controlled communication systems].
> . . . .
> Except in the rare and uninteresting special case where the receiver can examine the entire contents of the system, there must be a means by which the receiver can scan the system and select some subset of the total set of possible messages. The problems of adequately indexing or abstracting a larger file of information are many.
> . . . .
> The ultimate criterion for evaluation of receiver-controlled communication systems ought to be receiver satisfaction. (p. 23)
> . . . .
> We view an information storage and retrieval system as a link in a larger communication system connecting an original source with an ultimate receiver. Such a link becomes necessary when the amount of information in the larger system is greater than the information-processing capacity of the receiver and when, for whatever reason, it is desirable to have the ultimate receiver determine at least in part what messages he chooses to receive or in what form he chooses to receive them. (p. 24)

Taylor, 1965:

> [There are] two major areas of an as yet unnamed subject, which in this paper is labeled "Subject X." This "Subject X" pertains to the theoretical, experimental, and operational study of the interface between man and systematized knowledge.
> . . . .
> In very broad terms, we are concerned with the interface between man and stored knowledge.
> . . . .
> The two divisions of "Subject X" are the information sciences and information engineering. (p. 77)
> The information sciences are based primarily on the applications of mathematics to the phenomena of message generation, storage, organization, structure, and transfer. Their study is . . . concerned . . . with the explication of both system and environment. (pp. 77-78)

. . . .

The second major division of "Subject X" is that of information engineering (technology?). We are here concerned with the design, operation, and management of systems for handling messages or packages of messages, frequently called documents. These systems include libraries and their subsystems, information and data centers, publishing and dissemination, management information; and all the offshoots of these such as indexing and abstracting, selective dissemination of information, and even the semi-formal systems that have evolved within a subject field. . . . (p. 78)

Taylor, 1966:

[The field of information science and technology] may be seen as a spectrum ranging from services, such as libraries, at one end, through systems design in the middle, to basic investigations in supporting fundamental sciences. To draw on a more familiar example, this same spectrum can be seen in medicine and related professions: from services, such as hospitals and their operating personnel, through medical practice in the middle, to basic investigations, in biomedicine and allied fields.

. . . .

[A] recent paper by this reviewer [Taylor, 1965] defined and discussed education in an unnamed field called "Subject X." This "Subject X" pertains to the theoretical, experimental, and operational study of the interface between man and organized knowledge, and is divided into two areas: information engineering or technology and the information sciences. The former is concerned with the development, design, and operation of information systems, including libraries, indexing and abstracting services, and information and data centers. The latter explicates systems and their components and is concerned with the basic sciences underlying system development: neurophysiology, linguistics, mathematics, logic, psychology, sociology, epistemology. The parallel from medicine is obvious. (p. 17)

Harmon, 1969:

Information science is viewed as a member of a class of integrative disciplines which emerged during the same time period in response to the same prevailing problem--the unity and use of science.

. . . .

Using the analogy of blind men studying the elephant, information science, as well as general systems theory, general semantics and similar fields, appears to be studying the same massive elephant. As blind men can assist each other in forming a helpful gestalt conception of their elephant, so can the interdisciplinary studies assist each other. (p. 459)

. . . .

The aims of these disciplines [information science, the newer behavioral sciences and several others] are similar, though their approaches vary. They seek optimal communication and interaction

between and among men, machines and nature. Collectively the integrative disciplines appear to be involved in a unity and use of science movement. They focus on systematic intrapersonal and interpersonal communication, through variable space and time contexts, in order to promote adaptive behavior in the cooperative or competitive pursuit of valued ends. (p. 462)

Merta, 1969:

> Informatics, which some authors also call informatistics, informatology, exagelectics, documentalistics, theory of scientific information, semantic theory of information, etc., is a new, arising branch of science, which has sprung up as a result of a study into the influence of information circulation (exchange) for the existence of human society. Informatics includes theoretical, experimental and applied fields, . . .
> . . . .
> [A theory of informatics concerns] the transformation of knowledge into communicable information by means of creating information sources and their circulation in the society through various channels. . . . (p. 32)
> . . . .
> [The task of theoretical informatics] is to study the sources of origination, circulation and utilization of information, to bring to light objective and subjective factors showing in the nature of low exchange of information in separate components of social life and the human society as a whole. The conclusions of this theoretical discipline must contribute to creation of optimum conditions of information origination and interchange, i.e. to creation of information systems both of individual and social type (pragmatic aspect of informatics). (p. 33)
> . . . .
> Generally speaking, publicistic and cultural information also belong to the sphere of informatics. (p. 34)
> . . . .
> [Its] object is to study and create social links and transmission (exchange) of information. The social contacts are a material, objective aspect of communication, whereas transmission is its non-material component. From this standpoint, informatics is a part of the general theory of communication. (p. 36)

Goffman, 1970:

> The fundamental notion underlying the behavioural problem in communication is the notion of effective contact between the information source and the destination. For example, effective contact is clearly the governing factor in the outcomes of the two most familiar communication processes, namely the transmission of knowledge and the transmission of disease. It is thus not surprising to find a striking parallel between these two processes. (p. 592)

Wersig, 1970:

> Documentary communication is a complex communication process of the structure: A transmits a message, the mediator B mediates the message, the mediator C mediates the message, and a recipient D receives the message. (p. 6)

Rozsa, 1971:

> [It] is necessary to introduce between the researcher and the information processes a new communication link which could be referred to, as is now the practice in specialized literature, as "information officer". (p. 373)

Goffman, 1973:

> Information science is essentially concerned with the study of the principles underlying communication processes and information systems. In general, a process is a time dependent phenomenon, i.e., a sequence of actions leading to some result. Thus, a communication process is a sequence of events resulting in the transmission of something called information from one object to another. The first object is called a source and the latter a traget or destination. The mechanism by means of which a process is realized is called a system. Systems whose function is the carrying out of communication processes are referred to as information systems.
> . . . .
> An information retrieval process can be thought of as an instrument for providing effective contact between the source and destination within a communication process. That is, a process which, when properly carried out, assures that the information transmitted from the source to the target is relevant, i.e., results in the accumulation of knowledge at the destination. Since processes are realized by systems, information retrieval processes are carried out by information retrieval systems. (p. 234)
> . . . .
> Since information retrieval is a communication process, information retrieval systems are concerned with identification, recognition, and transmission of information. (p. 238)
> . . . .
> An information retrieval system must provide effective contact between its information source (its file) and its users. (p. 239)

Licklider, 1973:

> In my assessment, computer-communication networks are vitally important . . . for the development of an important and, indeed, essential information science. They can make it possible for people and programs to interact with one another and with organized stores of information. (pp. 168-169)

Rathswohl, 1973:

> The purpose for which information systems are designed was described . . . as an attempt to bridge a gap between information production and information utilization. Information production is equivalent here to technical improvements in the information on which utilization is based, utilization referring to knowing activity in general. We see ourselves designing information systems as means for improving man's ability to make sense of a complex world. (p. 28)
>
> . . . .
>
> Information science . . . charges itself with meeting the information needs of people. (p. 42)
>
> . . . .
>
> We have argued that information science has traditionally viewed its subject matter as the problem of linking information and action and that the purpose for designing information systems has traditionally been to effect such a linkage. Indeed, information systems have often been conceived as the actual process of information production and utilization, as in the case of command and control. As a general statement, information science has traditionally seen its task as designing processes that would not only guarantee 'better' information but also guarantee 'better' action, e.g., decision-making and planning, based on the use of that information. (p. 83)
>
> . . . .
>
> [Information science] has typically seen the function of information systems as serving a linking function, specifically a conveyor or carrier function of taking information from expert sources and passing it on to non-expert potential users. (p. 110)
>
> . . . .
>
> [The] legitimate interests of information science concern the understanding of the system of information flow at all levels in society. (p. 113)

Vickery, 1973:

> The emerging discipline of information science does not study communication to motivate or amuse, and communicating to instruct (education) is only of marginal interest. . . . [The] center of our study is informative communication. . . . However, we know very well that not all information transfer is via records--a great part of it is personal, face-to-face--and a new science would be unwise to restrict its scope to documentary transfer. (p. 150)
>
> . . . .
>
> [Information science] is concerned with that aspect of human communication the purpose of which is to <u>inform</u>; which is rarely a single act, direct from source to receiver, but is usually <u>mediated</u>, a chain of acts through intermediary sources; and which involves <u>search</u> activities by all parties concerned. . . . Information science is also concerned with the social aspect of this field of communication. (pp. 153-154)

> A fairly persistent search in sociological texts over the last few years reveals only modest contributions to the scientific understanding of informative communcation. Stripping the process down to its simplest terms, H.D. Lasswell recognizes five key aspects to communication: who, says what, in which channel, to whom, with what effect. These aspects can be rephrased as the concepts of source, message, channel or medium, receiver, and response. All the factors that can interfere with or distort information transfer are classed as noise, and the attempt to allow for this leads to repetition of content or redundancy. (p. 154)
>
> . . . .
>
> The subject of information science is informative communication, usually mediated and involving search on the part of both sources and receivers. Information received can lead to the operation of a routinized program, or to problem-solving activities. There are thus two forms of informative communication--the transfer of routine information; and the transfer of new information.
>
> Traditionally, the first form has been studied mostly as an aspect of management and administration, the second as the province of the information worker. . . . There may be a case for regarding both forms as part of the same discipline, but I prefer the present practice of restricting the field of information science to the communication of new information. (p. 160)

Diemer, 1974:

> On the one hand this term [information science] denotes the whole complex of institutions, activities, apparatusses, etc. which in some way has something to do with "information". Accordingly an "informator" can be regarded as a person who in general is not active scientifically but functions as an intermediate of information (e.g. an indexer, retriever). However, there is one additional point: when speaking about "information" or "information systems" and the like, then, in most cases . . . systems are meant which render possible "scientific information", or, more specific "information on scientific facts" and the like. . . . [What] is concerned is the area of human activities, which, according to general belief . . . is regarded as the "collecting, evaluating, ordering, storing, retrieving and providing of information". (p. 193)
>
> From this preliminary characterization some essential consequences follow: in a negative sense it is excluded that we are here concerned with primary research, as e.g. in the area of biology ("hereditary-information") or of mathematic ("information theory") etc. Rather we are concerned here with the collecting, processing and making available of whatever is understood by information, such as news items, representation of facts, knowledge, etc. (pp. 193-194)
>
> . . . .
>
> [Information] is not a primary production of text: the informator does not produce primary texts e.g. articles, reports, etc. as perhaps the writer or the scientist or the journalist also--and here the discussion starts--since information activity is always concerned with given text products which it wishes to mediate: the first decisive step--well known--being the indexing process. (p. 199)

Koblitz, 1974:

> *Information and documentation is a field of activity in* socially organized information
> - whose purpose is to cooperate with the efficacious streamlining of informational and communicational contacts between people in human society and
> - whose specific tasks are to supply high-quality information to all potential users informing them about new knowledge, experience, concepts, conjectures, theories, hypotheses, predictions, etc. from all spheres of human activity on the basis of
> - analysis of user needs in documental information as well as the corresponding planning of information and efficient methods, means and organizational modes for production, storage, retrieval and dissemination of documental information of analytical and synthetical nature. (pp. 243-244)
>
> We refer to this kind of information as documental since the result from the stage of activity in their production that is called "documentation". (p. 244)

Martyn, 1974:

> This reviewer's viewpoint is that our field of study [information science] may one day become a science. If it does, it will be a 'soft' science, related to sociology and psychology, rather than an exact one. The term 'information' is the real handicap. If we abandoned the word 'information' and thought, instead, of 'communication,' we might develop a more meaningful and productive mental attitude. Our proper preoccupation is, after all, with the interrelationship of people and ideas. It is true that much of our daily work is concerned with the handling and processing of documents, the means of communication with the past, but experience is beginning to teach us that communication with the present is of at least equal importance. (p. 21)

Rosenberg, 1974:

> I see it [information science] as the quest for understanding of the nature of information and man's interaction with it. (p. 263)
> . . . .
> We must being to look at the interrelationships between various parts of the information environment.
>
> We must begin to pay more attention to the social, cultural, and spiritual aspects of human communication. (p. 268)

Saunders, 1974:

> If we are concerned with human communication--and surely this is our central concern--then we are concerned with subjectivity, with value systems, however much some scientists may flinch at the very mention of such terms. And this matter is certainly not of merely theoretical significance. I would put it to you that at the practical level of everyday information work, a good practitioner

> is making his own adjustment to subjectivity on every occasion when his experience, training and insight enable him to penetrate his client's unconscious barriers, to identify his true needs, and successfully to match them with the appropriate information. This, surely, is the 'art' of the information worker, . . . (p. 67)
> . . . .
> I have put forward the view that confusion about the information scientist's role is perhaps largely a historical and terminological problem: that if we reserve the term 'information scientist' for those engaged in theoretical work on the science of information, and call those engaged in the practice of information work--whatever the discipline--'information workers', or some such term, then the problem would largely disappear. (p. 69)

Wersig, 1974:

> "Information sciences" then are all the scientific disciplines concerned with information processes which are affected by systems of organized communication. By "information" in this understanding is meant "reduction of uncertainty", by "information process" is meant "communication process intended to reduce uncertainty". (pp. 171-172)
> . . . .
> [These are the] components of information processes and systems
> - communicators (e.g. authors)
> - recipients (e.g. users)
> - mediators (e.g. libraries)
> - mediation technology (e.g. computers)
> - messages (e.g. documents). (p. 175)
> . . . .
> If we cannot achieve that the information workers and scientists are aware of their social function as active mediators between producers of data and recipients of data (and not only collectors of documents), information and documentation will never reach the state where they really decrease the distortions of technical and scientific communication. (p. 182)

Debons, 1975:

> It is the business of helping individuals form information from data and applying this capacity to day-to-day problems that the information counselor's role finds expression. If we are to help the user, the task is [to] improve the interface between the user and the vast reservoir of available data. (p. 63)

Bookstein and Cooper, 1976:

> Information retrieval systems (by which will be understood here reference and document retrieval systems as opposed to data retrieval systems) have frequently been compared to communication systems in which an author communicates with a patron of a system by means of a document. The patron, perhaps anticipating the retrieval mechanisms of the system, translates a felt need for information into a verbal request which he brings to the system;

by means of the request, perhaps further transformed, and a processed version of the document collection (the "document surrogates" or "index records"), the system predicts the extent to which each document is "relevant" to the user, that is, would be judged by the user to be an appropriate response to his request. The system then acts as a switching mechanism, connecting its patrons to those documents likely to be of interest to them. (p. 153)

. . . .

The partitioning of the collection, permitting a search that is more efficient than a random search of the collection, is the fundamental service provided by the system for its users. (p. 154)

Farradane, 1976:

What is called 'information science' has grown out of practical needs: the need to know what has been done; the need to keep up to date; the need to save time and money if something has already been done, or has proved ineffective. Human civilization, as compared with the organization of other animal groups, has been infinitely more successful because man has been able to communicate and record acquired experience, and to transmit it from one generation to another. (p. 91)

. . . .

[We] are concerned with human intercommunication which . . . always involves some medium of communication. . . . [We] shall of course be concerned mainly with writing or some other form of more permanent record as the means of transmission. It is important to note that there is a human being . . . at each end of the chain; furthermore, there may be other persons, such as editors, indexers, or computer programmers, who will influence the communication processes and probably distort the communication in varying degree. . . . Information science must . . . include some study of human beings, and in particular their processes of thinking and their behaviour in all actions relating to communication, whether they are the originators, the manipulators, or the recipients of communications. (p. 96)

. . . .

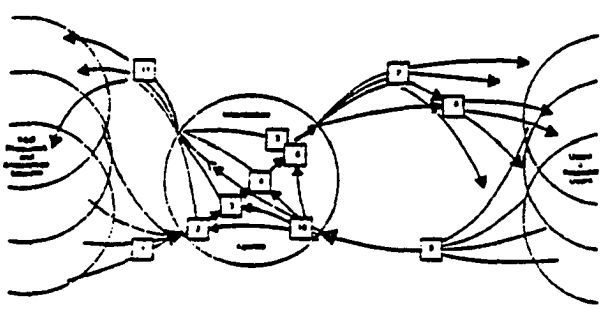
The manipulation of the various forms of the representation of thought is the main consideration in communication. We shall need to study all the distortions and errors that can occur, with the aim of eliminating them as far as may be possible by controlling the conditions of communication. This involves all the well-known processes of editing, publication, dissemination, indexing, coding, storing and computer handling. Intermediate human beings are also involved in these processes. The processes are then, so to speak, reversed by the techniques of retrieval until the stage is reached where the medium again becomes some form of stimulus to the mind of the recipient, who converts it back into his thoughts; . . . Furthermore, if intermediate persons are involved, the representations concerned in communication are liable to suffer great change, since these persons will behave as recipients who convert the representations to thought and back again into probably modified representations. (p. 99)

Roberts, 1976:

> Information work, as practised by intermediaries such as librarians and information specialists, among others, is a communication function within a social context, the facilitation of a social act which, in information jargon, is sometimes misleadingly described as information flow. Out of, and around, the complex of social issues associated with 'information transfer' or 'flow' there has developed a cluster of research and investigative activities, fundamental and applied, which have come to be labelled, loosely, it must be admitted, information science. (p. 249)
> . . . .
> The complementary activities of theory and practice [in information science] have only one aim, the improvement of the presentation, transfer and use of information. These ends are practical. It is this practicality that gives to information science its significance and meaning, and gives to theory its purpose. (p. 256)

Havelock, 1977:

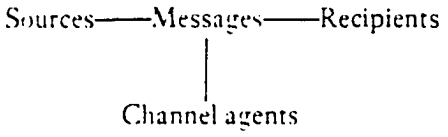
> [The] information agency must face in two directions simultaneously and must carry on a two-way dialog with users and potential users on the one hand and knowledge builders and providers on the other. (p. 59)
> . . . .
> As can be seen, this model of information functions parallels that of the ideal school media center. The media specialist sometimes acts as linker to the district service, provided by the supservisor, and at other times provides the services within the information environment of the local school. In this model it is the linking person, supervisor or media specialist, who is of prime importance. The resourceful person can always find the information and solutions needed. At a time when professional positions are being cut in the name of economy it is this linker role we need to emphasize. (pp. 59-60)
> . . . .



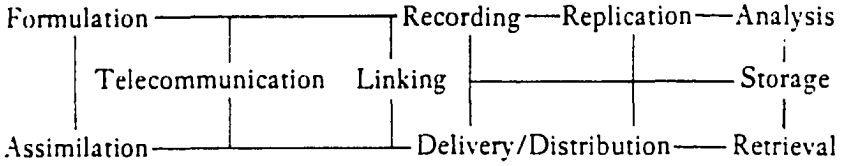
(p. 61)

Vickery, 1977:

> In the sense used here, information science is the scientific study of the communication of information in society. (p. 1)
>
> . . . .
>
> The overall transfer process can be expressed as follows:
>
> (K_S)——M_S——M_C——I——(K_R)
>
> A knowledge source (K_S) emits a message M_S that may be modified on transmission through a channel, to reach the recipient as M_C. From this message the information I is extracted for assimilation into his knowledge structure (K_R). (p. 3)
>
> . . . .
>
> To my mind, information science can be regarded as focussed on the channels of informative communication.
>
> . . . .
>
> [A] channel is the chain of people, machines and documents that lies between the human source which emits a message and the human recipient who assimilates information from it. Consequently, messages as they are recorded in documents are, in my definition, within the channel. . . . Consequently, any intermediary activities between source and recipient come within the scope of the definition.
>
> We may represent the situation as follows:



> The essential feature of the channel can be characterized as messages in motion. . . . The messages are initiated by S, assimilated by R, and transferred (with or without modification) by intermediary agents, C. (p. 7)
>
> . . . .
>
> To this point, channels of informative communication have been characterized as systems of people, documents and machines that are involved in the transfer of messages. More specifically, there are a number of social functions that together make up the information system. These functions may be broadly summarized as follows:



(p. 12)

Debons, 1978:

> If information is both a process and a commodity--and humans are involved in both--then the service that supports these functions should in fact have the capability of aligning both towards the achievement of maximum user satisfaction. This is what I believe is meant by the "user's needs". And the alignment function I propose can best be realised by the information counsellor who, of all resources, best understands the user's needs. (p. 484)
>
> . . . .
>
> If we are to help the user, our task must be to improve the interface between the user and that vast reservoir of data, information and knowledge available to him. (p. 485)

7.7. Definitions about Objects and People: To create and transfer

American Documentation Institute, Ad Hoc Committee, 1955:

> The Committee reports that . . . it based its choices on the belief that a definition should encompass both theory and practice, emphasize the quadruple aspect of production, organization, retrieval, and dissemination, and suggest the social implications of these activities. (p. 254)

Landau, 1958:

> Documentation
>
> . . . .
>
> The most authoritative definition of the word is that adopted by Aslib in 1945 for the Journal of Documentation, namely, 'Recording, organization and dissemination of specialized knowledge.' Documentation does, in fact, embrace the whole gamut of operations from the discovery or creation of new knowledge, through its publication, analysis, classification and arrangement to its arrival at the user; that is to say, report writing, publication, abstracting, classification, indexing, reassembly, presentation and dissemination. (p. 111)
>
> . . . .
>
> The documentalist is not primarily concerned with the handling of books, pamphlets, etc., as units but rather with assembling the information contained within documents together with data from other sources to form a new compilation. (p. 112)

Taylor, 1965:

> [There are] two major areas of an as yet unnamed subject, which in this paper is labeled "Subject X." This "Subject X" pertains to the theoretical, experimental, and operational study of the interface between man and systematized knowledge.
> . . . .
> In very broad terms, we are concerned with the interface between man and stored knowledge.
> . . . .
> The two divisions of "Subject X" are the information sciences and information engineering. (p. 77)
>
> The information sciences are based primarily on the applications of mathematics to the phenomena of message generation, storage, organization, structure, and transfer. Their study is . . . concerned . . . with the explication of both system and environment. (pp. 77-78)
> . . . .
>
> The second major division of "Subject X" is that of information engineering (technology?). We are here concerned with the design, operation, and management of systems for handling messages or packages of messages, frequently called documents. These systems include libraries and their subsystems, information and data centers, publishing and dissemination, management information; and all the offshoots of these such as indexing and abstracting, selective dissemination of information, and even the semi-formal systems that have evolved within a subject field. . . . (p. 78)

Hoshovsky and Massey, 1968:

> [We] offer a definition of information science, framed in terms of the results which it should produce, . . .
> . . . .
>
> Information Science is that <u>body of knowledge</u>, consisting of descriptions, theories, and techniques, which provides <u>understanding</u> of the <u>means</u> through which society's <u>information needs</u> are met and which provides understanding required to improve capabilities to define and meet such needs. (p. 47)
> . . . .
> Information Science inherently involves a joint venture on the part of two "partners" whose objectives are quite divergent. One view is that of the Producer, the information scientist himself, the contributor to the organized body of knowledge. The other is that of the User who is interested in payoff, in what information science can do to help him accomplish his purposes, and who pays the bills. (pp. 47-48)

Dolan, 1969:

> The information cycle begins the generation of an idea . . . and the process proceeds . . . through the full cycle where the original idea is reconfirmed, refuted, extended or modified. One of the responsibilities of an information system is to make sure that an idea, once promulgated, is retrievable. In short, to ensure "that the wheel is not re-invented". (p. 39)
>
> • • • •

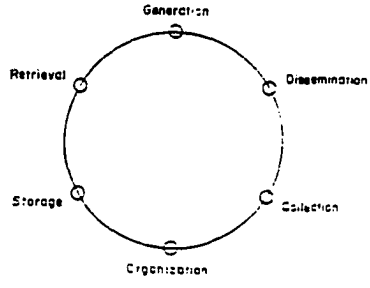


FIG. 1. The information cycle. (p. 40)

> • • • •
>
> [Future] information systems would consist of three components: man, machine, and the corpus of information. (p. 40)
>
> • • • •
>
> [There] are no operational information retrieval systems in existence today. Nor are there many <u>document</u> retrieval systems. Most of the so-called IR [information retrieval] systems actually retrieve <u>references</u> and the user must then locate the document(s) which, hopefully, contains the required information. The future <u>may</u> see true information retrieval--semantic analysis of documents with display of relevant portions--but such systems are still on the horizon. The emphasis to date has been in retrieving the "medium" as an intermediate step in retrieving the "message". (p. 46)

Klempner, 1969:

> Information science is analyzed to be comprised of the segments of: (1) Conceptualization, (2) Storage/Transmission, and (3) Utilization. (p. 339)
>
> • • • •
>
> [The] product of conceptualization is information. . . . It is only after this process of imposing organization, of conceptualizing what at first were bits and pieces of unrelated data, that we feel informed.
>
> • • • •
>
> Activities in information science employing the conceptualization process may be said to include: indexing, abstracting, classification, thesaurus-building, subject-heading work, document selection, development of interest profiles, and a number of other similar activities.
>
> • • • •
>
> Information science can and does concern itself with the <u>physical</u> attributes of symbols and signals, their production, storage, transmission, and manipulation. This segment of information science I have labelled the <u>Storage/Transmission Segment</u>. (p. 340)

> . . . .
> [Information science] investigations would seek to emphasize here . . . the means of storing and transmitting symbols and signals . . . the storage transmission channels, their networks, their efficient organization and administration, but not with that which is transmitted, i.e., the information itself.
> . . . .
> Should not information science delimit its interests to those symbols and signals that have a direct bearing on the transmission of previously recorded information, i.e., document-stored discourse?
> . . . .
> [In] the Utilization Segment of the information science field . . . we can identify and group such activities as relevance assessment, management appraisals, evaluation of community satisfaction or the satisfaction of national or international cultural, ethical, recreational or socio-political goals. (p. 341)

Klempner, 1969a:

> Information science is analyzed to be comprised of the segments of: 1) Conceptualization, 2) Storage/Transmission, and 3) Utilization. (p. 335)
> . . . .
> [The] product of conceptualization is information. . . . When we engage in the process of conceptualization, we are in essence carrying out a subjective process. What we are doing is selecting and organizing particular elements out of our current experience and linking these elements with others that are distant in time and space. It is only after this process of imposing organization, of conceptualizing what at first were bits and pieces of unrelated data, that we feel informed.
> . . . .
> [The] process of conceptualization is a subjective process and . . . the product of this subjective process, an abstraction derived from the subjective selection and imposition of organization, certainly ought not to be evaluated by the information scientist for its degree of objectivity. (p. 336)
> . . . .
> It is incumbent on us to study this process and apply it in our own field. Activities in information science employing the conceptualization process may be said to include: indexing, abstracting, classification, thesauri-building, subject-heading work, document selection, development of interest profiles, and a number of other similar activities.
> . . . .
> It must be reiterated, however, that when we are investigating the conceptual attributes of the interpretation of symbols and signals, whether conceptualized, coded, and transmitted by information scientists or by others, we are dealing with "information," i.e., representations of subjective notions which . . . do not lend themselves to sustained and rigorous scientific investigation and proof. (p. 337)

Krubeck, 1971:

> The information specialist must be trained to create information from data and establish an information network capable of transferring information that will improve the decisions of executives.
>
> Specialists must be taught the difference between data and information and that information is not a substitute for executive knowledge or wisdom.
>
> 1. Information is data that has been massaged by human logic and emotion and is in a form that allows for analysis and comparison by gross and finite factors of magnitude and cause stated in the user's language.
> 2. Knowledge is information that is understood by the user.
> 3. Wisdom is the accumulation of knowledgeable concepts that are associated and compared and culminate in a new idea. (p. 208)

Tague and Carroll, 1973:

> In addition, the time is upon us when information scientists must abandon their passive role as acceptors of information and add to their activities of collation, storage and retrieval the functions of active acquisition and of purposeful and imaginative dissemination. Intelligence operations and those of news media, especially the business press, provide models in whcih information specialists, differentiated according to the orientation of the user, actively approach information generators to acquire timely, authoritative information and implicitly superimpose critical judgment upon it. Nor should the advertising and communications arts franternities be the only ones to package information in the most attractive and useful manner before its dissemination. This too is among the neglected functions of the information specialist. (p. 42)
>
> . . . .
>
> But . . . we are not out to propagandize, pander, palliate, or titillate. We see it as the function of the information scientist/specialist to tell it 'like it is' and the name of the game is involvement. Finding out what the members of the community served want to know, acquiring that information, and marshalling our skills in information science to structure and display it in the manner most useful and acceptable to our community.
>
> We do not assert that the kind of information centres described here do not exist. They do. Stockbrokers have them, as do police, airlines, credit bureaux, oil companies . . . but information scientists, by and large, aren't involved. (p. 44)

Koblitz, 1976:

> Information and documentation is a working field of socially organised information activity and, in particular, of specialised information activity. . . .
>
> The underlying principles of this activity are:
>
> --the analysis of user needs for documentary information taking

account of its findings in information planning, and

--the introduction of efficient methods, working facilities and organisational forms for the generation, storage, retrieval and dissemination of documentary information.

. . . .

Instead of the common term documentary information, the synonymous expression documentary-factographical information is used . . . to emphasise the fact that information and documentation activities are concerned with information items generated, stored, retrieved and disseminated in this working field--which, in contrast to documento-graphical (bibliographical) information, contain statements about facts and other subject-matter, but, on the other hand, definitely differ from the factographic information items of primary documents (e.g. printed publications). (p. 32)

Levitan, 1980:

[Information science] involves the study of the phenomenon of information. This phenomenon appears to be inherent to all systems--human and nonhuman, living and artificial. . . . (p. 244)

. . . .

In human, societal contexts, information systems are generally designed, evaluated and operated on the basis of users' information needs and uses. Activities performed by an information system are linked to a user system through needs and uses. Consider, for example, the following basic set of information system functions:

- collection (selection and evaluation of information)
- organization (classification and indexing of information)
- storage (filing and shelving of information)
- retrieval (query formulation and searching for information)
- dissemination (display and transfer of information)
- generation (creation of new information, learning)

Every one of these functions involves the specification of information needs and uses.

. . . .

Moreoever, each of these functions requires agents to perform them and has information inputs and outputs of its own. Each aggregate of information agents, actions, inputs and outputs is a subsystem of the information system. Each subsystem is itself a user system and, therefore, must have an information system of its own. Although each subsystem must have a full set of information processing capabilities so as to use and produce information, it is seen performing one processing activity at a time in relation to the component subsystems of the information system. (p. 255)

. . . .

Traditionally, science has been viewed either as a body of knowledge concerning scientific methods (through studies in philosophy and history) or as a social system (through sociology). Information science research converged both perspectives in an effort to study how science as a collective whole uses and produces information. (p. 257)

. . . .
The future development of information science as an integrator of the sciences depends on the ability of its leaders and researchers to foster interdisciplinary research teams which could expand, test, refine and provide a holistic approach to information science research. (p. 266)

7.8. Definitions about Objects and People: To create and use

Bracken and Shilling, 1966:

The field of information science in the United States can be defined as that field of academic study and professional practice concerned with the nature, handling and function of information and with all aspects of its generation, control and use in society. (p. 1)

Harvey, 1967:

[Information science] is the study of the responsibilities and skills in indexing, abstracting, writing, editing, translating, information center administration, patent searching, literature searching, systems analysis, and information research.
. . . .
[It] covers the entire continuum of information transfer--that is, the flow or handling of information from the writing of literature by an author; through its editing, printing, publishing, and distribution by the publisher; through indexing, abstracting, and distribution in reference journals; through acquisition, organization, storage, and promotion of use in an information center; and through its use by another author and, perhaps, the production of new literature. (p. 422)

Weisman, 1967:

Documentation, there, is concerned with the theory and practice of producing storable items of information in a form of convenience to the subsequent researcher, and so organizing them as to facilitate their retrieval and the dissemination. In general, in this country [the U.S.], the use of the term documentation denotes documents; and the documentation specialist or documentalist is looked upon as a custodian of or the handler of documents. We have been careful, in this country, to differentiate between document storage and retrieval, and information storage and retrieval.
Information science . . . was born out of the technology that produced data and information processing equipment. As a term, it is scarcely more than six years old; it made its first appearance

> as science information. Reflection on the requirements for the competent processing of science information led to the coining of the term and the field of information science which is concerned with the properties, behavior, and flow of information: What information is; how it is gathered, processed, and stored; how it is expressed and communicated; and how it is used, by both individuals and man-machine systems. (p. 8)
>
> . . . .
>
> Information science is a basic and major component of communication; it studies the creation, management, and exploitation of recordable knowledge. (p. 11)
>
> . . . .
>
> Communication sciences, in my opinion, is an interdisciplinary discipline whose concerns are the multiple processes of communication and exchange of information by natural and artificial systems. Within its study are natural (human, animal, and insect) and artificial languages (including codes used in communication systems, design languages, programming languages for computers, and the formal language of mathematical logic) as modes of communications. (pp. 11-12)

Kenney, 1968:

> Documentation--Storing and retrieving information, in whatever form it may appear, with greater depth of indexing than conventional library methods, and the possible use of machines for both storing and retrieving. In its broadest definition, analyzes the whole information process.
>
> . . . .
>
> Documentalist--See Information Specialist. (p. 14)
>
> . . . .
>
> Information Specialist--Often a scientifically trained person whose specialty is the literature of science and technology. May perform the following tasks: Indexing, construction of thesauri, abstracting, literature searching, reading in a given field to keep up and pass on to researchers essential information, etc. May be concerned with analysis of the whole information process, from originator to user.
>
> . . . .
>
> Information Scientist--See Information Theory.
>
> . . . .
>
> Information Theory--This relatively new field of inquiry attempts to relate knowledge from the fields of logic, mathematics and communication theory to the entire information process, from originator to user . (p. 15)
>
> . . . .
>
> Data--Specific bits of information such as figures, dates, etc., as opposed to Information which may be ideas, topics of varying scope, etc. (p. 14)

Leslie, 1968:

> The nature of our work is usually recognized, especially by outsiders, when we talk about information storage and retrieval or perhaps about computer processing of nonnumerical information. However, these are long, inconvenient and insufficiently descriptive word strings. Their awkwardness has encouraged such designations as information handling, information processing, information science, the information sciences and information technology. The somewhat wistful desire to be working as somethingologists in the field of somethingology has also prompted us to entertain suggestions such as informology and sariology. But none of these ever approached the status of common acceptance. So documentation, while considere d inappropriate by many people, remained at least the most commonly used. (p. 293)
>
> . . . .
>
> From the original idea of providing better indexing and retrieval techniques for wartime documents, the new documentation expanded in no time at all to include almost anything that could happen to a recorded communication from the time its originator first jotted down a thought to the moment when some future user found it and used it. The dictionary makers, who had always defined documentation in terms of substantiating evidence, finally gave it an additional meaning as the generation, reproduction, dissemination, storage, retrieval and use of information. (p. 294)
>
> . . . .
>
> Another noticeable trend is the gradual disappearance of information storage and retrieval as a discreet subject. . . . [They] are now merely two of the functions in the entire gnerationa-to-use process which constitutes the complete interest area of information science. (p. 296)

Salton, 1968:

> Information retrieval is a field concerned with the structure, analysis, organization, storage, searching, and retrieval of information. . . . [The] use of modern computing equipment and sophisticated language processing methods appears to provide the necessary means for generating acceptable solutions [to information handling problems]. (p. v)
>
> . . . .
>
> An information dissemination system may be used to assist in and to control, to some extent, the generation, recording, analysis, classification, storage, search, and retrieval of information. Information in this context may consist of data items, such as facts or measurements, or it may consist of written texts, documents, books, summaries, abstracts, titles, and so on. The information dissemination process is best described in terms of three main components: information generation, information processing, and information utilization. . . . The first component, information generation . . . is presently not a part of any formalized system but is handled by personal communication between the parties involved. (pp. 4-5)
>
> . . . .

. . . .

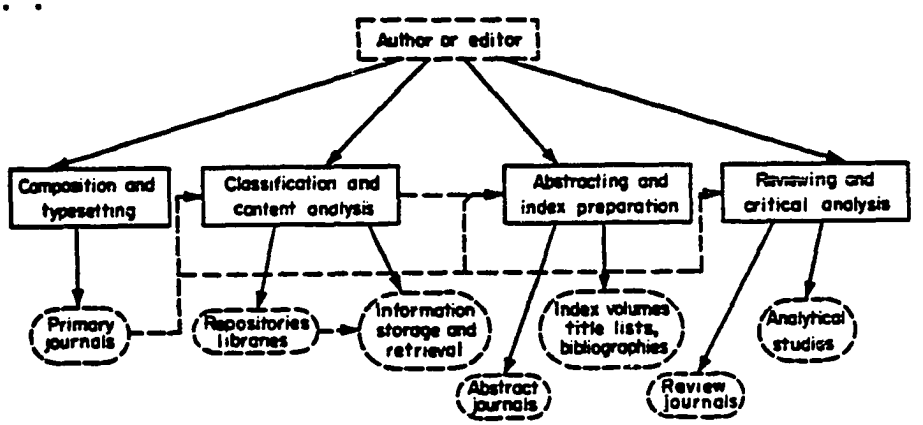


Fig. 1-1 Information generation and dissemination.

(p. 4)

Merta, 1969:

> Informatics, which some authors also call informatistics, informatology, exagelectics, documentalistics, theory of scientific information, semantic theory of information, etc., is a new, arising branch of science, which has sprung up as a result of a study into the influence of information circulation (exchange) for the existence of human society. Informatics includes theoretical, experimental and applied fields, . . .
>
> . . . .
>
> [A theory of informatics concerns] the transformation of knowledge into communicable information by means of creating information sources and their circulation in the society through various channels. . . . (p. 32)
>
> . . . .
>
> [The task of theoretical informatics] is to study the sources of origination, circulation and utilization of information, to bring to light objective and subjective factors showing in the nature of low exchange of information in separate components of social life and the human society as a whole. The conclusions of this theoretical discipline must contribute to creation of optimum conditions of information origination and interchange, i.e. to creation of information systems both of individual and social type (pragmatic aspect of informatics). (p. 33)
>
> . . . .
>
> Generally speaking, publicistic and cultural information also belong to the sphere of informatics. (p. 34)
>
> . . . .
>
> [Its] object is to study and create social links and transmission (exchange) of information. The social contacts are a material, objective aspect of communication, whereas transmission is its non-material component. From this standpoint, informatics is a part of the general theory of communication. (p. 36)

Otten and Debons, 1970:

> The fundamental nature of information per se can also be demonstrated by the processes of information transmission or communications in general. Any transmission link can, in principle, be used to transmit every kind of information. A communication channel provides the means for the transmission of information. This involves the transmission of a physical signal. However, this signal can be used to convey any form of information. For example, it can convey information expressed in the language of computers, information in the form of speech, of graphics, or even of motion pictures (TV). The operations performed in transmitting the various physical representations of information are one and the same; . . . (p. 90)
> . . . .
>
> Information is generated, processed, and used by men. If machines are involved in handling information, these machines generate, process and use information under the control by man and for man. (p. 92)

Yovits and Mathis, 1971:

> [We] consider information science to be a broad discipline concerned with the generalized study of information flow. Information is defined as data of value in decision making and a "generalized information system" of virtually universal applicability is accordingly established. We then define computer and information science to be the study of information processing and information flow in this generalized system. (p. 118)
> . . . .
> Although this model was first developed to describe a military command and control situation, it was soon recognized that this model is much more general and highly descriptive and has virtually universal applicability as well. This model covers all aspects of information including its generation, collection, classification, transmission, and utilization. . . . . (pp. 119-120)

Becker, 1973:

> Information science is . . . concerned with the way different people create information, index or label it, store it, find it, analyze it, send and receive it, and use it. (p. 18)
> . . . .
> Information science. The study of how man creates, uses, and communicates information in all forms. (p. 86)

Debons, 1973:

> I am pleased to realize that the distinctions of information as a human processs, [and] information as a commodity have received some consideration and acceptance among us.
> . . . .
> [Information science] must deal with three aspects of Information, namely: generation, utilization and transfer. I believe the task of a science of information is not primarily concerned with principles

> underlying the separate aspects . . . but rather, the concern . . . is to discover the relationships between these aspects. (p. 5)
> . . . .
> In brief, the recognition of a need for a science of information emerges from three fundamentally different sources: those concerned with the development of information systems (these are primarily engineering-oriented), those concerned with the logistics of information distribution, such as librarians, and those concerned with the social and human aspects of information processes. These three elements . . . represent the belief systems which underscore the need for a science of information. (pp. 161-162)

Rathswohl, 1973:

> The purpose for which information systems are designed was described . . . as an attempt to bridge a gap between information production and information utilization. Information production is equivalent here to technical improvements in the information on which utilization is based, utilization referring to knowing activity in general. We see ourselves designing information systems as means for improving man's ability to make sense of a complex world. (p. 28)
> . . . .
> Information science . . . charges itself with meeting the information needs of people. (p. 42)
> . . . .
> We have argued that information science has traditionally viewed its subject matter as the problem of linking information and action and that the purpose for designing information systems has traditionally been to effect such a linkage. Indeed, information systems have often been conceived as the actual process of information production and utilization, as in the case of command and control. As a general statement, information science has traditionally seen its task as designing processes that would not only guarantee 'better' information but also guarantee 'better' action, e.g., decision-making and planning, based on the use of that information. (p. 83)
> . . . .
> [Information science] has typically seen the function of information systems as serving a linking function, specifically a conveyor or carrier function of taking information from expert sources and passing it on to non-expert potential users. (p. 110)
> . . . .
> [The] legitimate interests of information science concern the understanding of the system of information flow at all levels in society. (p. 113)
> . . . .
> This dissertation proposes that informatology's 'main contribution' to information science be reconceptualized around two interrelated tasks that directly derive from the considerations of critical metascience. The first task involves the design of an adequate critical framework for information science; such a framework would apply not only to information science per se but would relate also to science and society as a whole. This critical framework would take the form of a theory of the relationship of information generation

> and information utilization. The second task of informatology would be to actually employ the critical framework to critique information science activities. (pp. 250-251)
>
> . . . .
>
> [The] critical task of informatology would be to determine the 'progress' of information system design activities in terms of how they contribute or detract from real-world, holistic, democratic inquiry.
>
> . . . .
>
> [Informatology is conceptualized] as a critical metascience with the practical intent of facilitating the information system design process.
>
> . . . .
>
> The proposal is for a critical science of information--informatology--which would itself be inquiry into the legitimacy of the fundamental principles of information. (p. 255)

Debons and Montgomery, 1974:

> The distinctions between "data" and "information" have a distinct influence on the nature of information systems. Data can be considered as coded signals received from the external world by an acquisition subsystem (e.g., the eye, the ear, radar). Transformations of the data result in what we generally refer to as "information." The transformations can be undertaken by mechanical systems (such as computers and displays), or biological systems (e.g., the central nervous system). In either case the difference between data and information is postulated on the assumption that processes occur that change the state of the receving agent (e.g., a person is "informed," or a machine has "information"). (p. 26)
>
> . . . .
>
> Information systems are environments composed of people, equipment, and procedures organized to achieve specific information objectives. . . . The objectives of an information system may be seen as the acquisition, processing, and dissemination of data (such as documents). Another major objective may be to aid in communication or in the decision function. Assuming that information systems are established to serve man in his attempt to deal with the external world, an information system can actually be said to have multiple, interlinked functions: the generation of information from data, the facilitation of the use of data or information for action selection, and the transfer of data or information to other systems or to people. (pp. 26-27)
>
> . . . .
>
> Data access systems are collections of man-machine operations and technologies directed mainly to the acquisition, manipulation, and delivery of coded signals such as alphanumeric displays. Some information retrieval systems are data-access systems, while others are explicitly document-transfer oriented. Management information systems are environments of man-machine arrangements and procedures that are directed at augmenting human capabilities in dealing with planning, operational, and control data. (p. 27)

Smith, 1974:

> Briefly, Information Science is concerned with how man communicates with man. It is the study of how information is transferred--from the point of generation to the point of use--and all the intermediate steps of collecting, organizing, interpreting, storing, retrieving, disseminating and transforming information. (p. 78)

Stolk and Holloway, 1974:

> Documentation. The process of collecting, organizing, storing, citing and distributing documents or the information recorded in them. (p. 11)
>
> . . . .
>
> Information science. The study of the generating, acquiring, processing, storing, retrieving, disseminating and use of information; it includes the study of the properties, structure and transmission of information and the development of methods for the useful organization of data.
>
> . . . .
>
> Information scientist. A person informed in the field of information science who is capable of observing, measuring and describing the behaviour, properties and flow of information, and who, through research, advances its understanding and use.
>
> . . . .
>
> Information specialist. An information scientist engaged in the processing of data in a particular field, such as human engineering or solid-state physics. A librarian, by way of contrast, specializes in document control and reference services.
>
> . . . .
>
> Information handling. The storage and processing of information and its transmission from the source to the user. Information handling excludes the creation and use of information.
>
> . . . .
>
> Information retrieval. The recovery of specific information from a collection. It includes all the procedures used to identify, search for, find and remove the specific information sought, but excludes the creation and use of that information. The term has now come to be used generically to include the retrieval of references, documents, facts and data as well as information.
>
> . . . .
>
> Information officer. A person responsible for the collection, searching for and dissemination of specialized information. (p. 16)

Fry, 1975:

> Efficient information processing and management has information storage and retrieval as a major component but includes as well the integrated cycle of communication from generation to utilization. (p. i)

> As a step toward resolving the confusion [between these two aspects], I would like to propose a new view of the foundations of a science of information, based on the functioning of organisms. The human organism is a model information system with three primary functions or organisms: the creation or generation of states (generation); the ability to use states in the accomplishment of tasks (utilization); and the capacity to convey to other organisms indications of our states (transfer or communication).
>
> I have indicated that the above foundations could support a concept of information science, on the basis that the organism is a model of an information system. . . . It is the interrelationship of the three functions that constitutes an information system, . . . (p. 76)
>
> . . . .
>
> [Information] is a meta-phenomenon and . . . the science of information is a meta-science. Consequently, the proposition needs to be advanced that these interrelations among the various foundations are critical to an understanding of information as a process, and in its use as a commodity. (p. 79)

Henriksen, 1977:

> IS [information science] is a subject in which one is mainly concerned with how someone does something with something, which provides the three major paradigmata: knowledge, operations and instruments (agents).
>
> . . . .
>
> The paradigm of operations has at least seven main elements.
>
> Generation
> Dissemination
> Selection (negative and positive)
> Analysis and representation
> Storage
> Retrieval
> Use. (p. 16)
>
> . . . .
>
> Problems like translation, adaptation, popularization and revision could become elements of this paradigm.
>
> . . . .
>
> We are first of all concerned with non-fiction literature. But what about the documentary and semi-documentary literary forms such as travel accounts, historic fiction, social fiction and biography? Should we be concerned at all with the information in novels, plays or poetry? (p. 17)

Institute of Information Scientists, 1977:

> Information Science is concerned with the science, art, and practice of the provision of information, particularly, but not exclusively, in support of professional and academic work. To this end, it includes the study of information from its generation to its exploitation, and of its transmission in a variety of forms through a variety of channels. (p. 22)

Koblitz, 1977:

> The goal of information and documentation science is to investigate the origins and evolution of information and documentation and, on the basis of the knowledge obtained, to develop theoretical principles and methods for improving the efficiency of this activity in all areas of planning, management, research and development, education, production and commerce, thereby promoting social progress and helping society to meet its targets.
>
> To be equal to these tasks, information and documentation must carry out the generation, storage, retrieval, processing, and efficient use of selective facto-graphic information tailored to user needs and presented in a concise form. (p. 14)
>
> . . . .
>
> [Tasks of social information processes are] identifying information needs of the users and planning the information service and the production, storage, retrieval, delivery and dissemination of information. (p. 15)
>
> . . . .
>
> Information and documentation science is a special discipline whose goal is to study the laws of the generation and development of information and documentation with a view to building up a theoretical basis for the continuing improvement and regular introduction of effective methods of information and documentation work in response to the steady growth of the social importance of this field of activity. (p. 17)
>
> . . . .
>
> The term 'information and documentation' should, therefore, be taken as synonymous to 'documentary information', so that 'information and documentation science' should be interpreted as 'the science of documentary information'. (p. 17)

Pratt, 1977:

> [The] province of Information Science should be (at least) three-fold: 1) the study of the motivations and purposes of individuals who create graphic records, 2) the study of the characteristics of the graphic records themselves, and 3) the study of the motivations and purposes of the individuals who use graphic records for various ends. A short definition of Information Science is:
>
> The study of the creators,
> the users,
> the uses,
> the characteristics and
> the distribution
> of graphic records. (p. 217)

Weiss, 1977:

> Information science can be defined as that set of principles and prescriptive rules dealing with the organization, maintenance, and management of bodies of scientific, technical, and business information used in decision-making. Information transfer then can be viewed as a communication problem. It is concerned with improving the communication of recorded information among three types of individuals or groups: (1) the originator of information; (2) the processor of information; (3) the user of information. Thus, information science must be an organized body of knowledge based on explanatory principles which seeks to discover and formulate in general terms the conditions under which facts and events relating to the generation, transmission, and use of information occur. (p. 2)
> . . . .
> Information management refers to efficient bibliographic organization and inventory control. Knowledge management refers to the principles, policies, and practices for guiding and controlling, in a socially and technically optimal sense, the generation, distribution, consumption and effect of this resource [knowledge]. One major, visible result of this change will be new generations of information systems which will permit interaction between man and stored knowledge, rather than between man and stored document descriptions. Finally, it must be recognized that these systems will operate in a networking environment. (pp. 3-4)

Mikhailov and Gilyarevsky, 1978:

> The major theoretical tasks of informatics are to reveal the general patterns of scientific information production, transformation, transmission and utilization in the vairous fields of endeavour. (p. 137)

Debons, 1981:

> Information professionals are concerned with information systems. Information systems are environments (i.e., organizations, institutions) of people, technology, and procedures that facilitate (a) the generation of new knowledge, (b) use of knowledge, and (c) transfer of knowledge for the purpose of solving problems and making decisions. Retrieval of documents, storage of records, indexing, cataloging, and so forth, are considered components of such systems.
> Information is the result of a human process, of which one can find evidence in a physical record--the record being the commodity. Information systems facilitate the human processes through the acquisition, use, and dissemination (transfer) of the commodities, but their essential objective is problem solving and decision making.
> Based on these postulates, the following definition of an information professional was established: An information professional may be differentiated from other professionals who may work with data by the fact that she/he is concerned with the content and therefore with the cognitive/intellectual operations performed on the data by the end-user.

Five main classifications of function were proposed for the study:
People who analyze the requirements and then design/implement such systems (information systems analysts and designers)
People who help end-users in their jobs through the use of such systems (data/information preparation on behalf of others; searching for data/information on behalf of others)
People who manage such systems (managing information operations, programs, services or data bases)
People who research such systems
People who train others to use such systems. (p. 247)

Wilson, 1981:

'Information science' is defined here as that set of practices and related disciplinary studies which is concerned with the generation, transmission, organisation, storage, retrieval and use of information together with studies of the user of information. In brief it is concerned with the subject areas outlined in Figure 1.
. . . .
It will be clear that 'information science' is not a unitary discipline revolving about a signle set of unique theoretical 'laws' and principles. Rather, it is a practical science in the same way that 'medical science' and 'agricultural science' are practical fields to which specific disciplines contribute research methods and findings. (p. 13)
. . . .

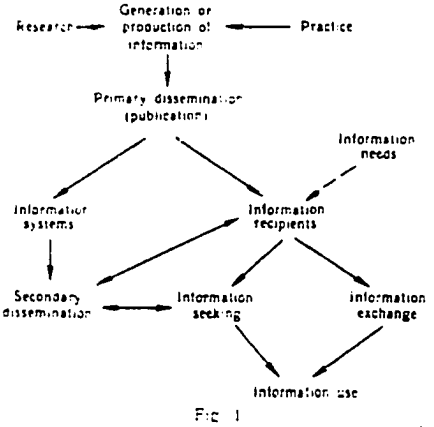


Fig. 1

(p. 13)

7.9. Definitions about Objects and People: To use

Mikolajski, 1955:

> Scientific and technical documentation is a complex of the following activities: collecting documents from a defined field of knowledge, acquaintance with, and presentation of, their contents, dissemination of information on the contents of documents among those connected with a domain of knowledge or industry, in order to facilitate work and accelerate the development of such field. (quoted by Dembowska, 1968, p. 15)

Perry, Kent, and Berry, 1955:

> Let us recall to mind that the basic purpose of documentation methods is to facilitate the efficient use of documents and other graphic materials. . . . (p. 246)

Becker and Hayes, 1963:

> Information storage and retrieval is . . . an integral part of the communication process, a direct outgrowth of the desire among men to communicate with one another. Knowledge has been recorded throughout the ages, and techniques and methods for storing and retrieving it have long been available.
>
> Information is the basic ingredient of decision making. (p. 3)
>
> . . . .
>
> The most fundamental objective of information retrieval is to help Man make fullest use of the knowledge he discovers and records. (p. 15)

Slamecka, 1965:

> There is a continuance of information science (and here the word "science" begins to lose its appropriateness) in the applied domain; here it is concerned essentially with the control of information and its use in society. (p. 16)

Hoshovsky and Massey, 1968:

> [The] outputs (products) which Information Science should be expected to produce . . . [are] three kinds of knowledge. 1) knowledge concerning the generation of data and knowledge, 2) knowledge concerning the transmission of data and 3) knowledge concerning the productive use of data and knowledge. (p. 48)
>
> . . . .
>
> We believe Information Science should be concerned with maximizing the contribution of data (or knowledge) to the general welfare and with minimizing the cost of meeting the information needs of the economy and the society. (p. 54)

Tou, 1969:

> In our complex and technologically-oriented society organizations are flooded with an enormous amount of management information. We are now faced with problems concerning the efficient use of communicated knowledge. The steady growth in the magnitude and complexity of information systems necessitates the development of new theories and techniques for solving these information problems. (p. vii)

Borko, 1970:

> In information science, systems analysis is used both as a general approach to the study of information systems and as an application of scientific techniques to the solution of specific information transfer problems. (p. 5)
>
> . . . .
>
> [An] analysis of information systems must begin with an understanding of information science--the theories of information science form the conceptual foundations of information systems. . . . (p. 6)
>
> . . . .
>
> An Information System is that combination of human and computer-based capital resources which results in the collection, storage, retrieval, communication and use of data for the purpose of efficient management (planning, decision-making, reporting and control) of operations in organizations. (p. 7)

Mason, 1970:

> [Information science] can be defined as the study of the processes involved in the exchange and correlation of knowledge. It will thus range from the physical, i.e. the quantitative measurement of information systems, to the psychological, i.e. the qualitative assessment of the effects of information systems and services on sentient beings, including here particularly the study of both the man/man and the man/machine interface.
>
> . . . .
>
> [In] the main we are involved in those information systems which relate to recorded knowledge in all types of media, and with methods of exploiting that knowledge, . . . (p. 309)

Kochen, 1974a:

> Concern with the processes of acquiring, accumulating, organizing, and using knowledge is of ancient origin. Insofar as these are central concerns of information science, we could say that information science has its roots in antiquity, except that these concerns were not pursued with the scientific method until a few decades ago. (p. 4)

Shera, 1974:

> [Information science] as it is generally understood is concerned with the behaviour of information in the total communication process, that is, its dissemination, utilization, and social effects. (p. 158)

Slamecka, 1978:

> The goal of the new information world is to bring knowledge to bear more effectively on the solution of purposive problems of man and his organizations--not only in science and engineering but in all sectors of prudent social activity. The two most general goal-seeking strategies are 1) to enhance the utility of existing knowledge; and 2) to improve the process and efficiency of generating new knowledge. The former strategy lies within the purview of the traditional information profession; the latter is in the province of information and computer science, and in that of many other problem-solving disciplines.
>
> These strategies are brought to fruition and reality through the design of "information systems"--complexes of considerable and growing variety as regards their purpose, power and size. (p. 458)

Hollnagel, 1980:

> Information science is concerned with the use of information by humans, where this use may involve storing, processing and transmission by machines. And it is concerned specifically with the way in which humans search for information, systematically as well as unsystematically. The basis for information science is therefore to be found in our experience of using and searching for information, . . . (p. 184)
>
> . . . .
>
> [Information science] is precisely interested in the meaningfulness of information, in the usefulness of information to the user.
>
> . . . .
>
> Information science is concerned with systems, humans and/or machines, which are retrieving information rather than just receiving information; they are <u>active</u> rather than passive, they are searching for information for a specific purpose and not just waiting to process it, should it happen to pass by. Hence the state of uncertainty of the receiving system attains considerable importance, and suggests another way of looking at information. (p. 185)
>
> . . . .
>
> I seriously suggest that information science, in spite of the connotations which are evoked by the word information, should concern itself more with the states of incomplete knowledge, uncertainty, and lack of information, than with defining information. (p. 186)

United Nations Educational, Scientific, and Cultural Organization, 1980:

> In the present context, informatics encompasses fields related to design, construction, evaluation, use and maintenance of data processing, storage and communication systems including hardware and software, as well as organizational and human aspects. Thus informatics in this sense includes what is often called computer (or computing) science, its technological and theoretical foundations, as well as its applications. (pp. 11-12)

Debons, King, Mansfield, and Shirey, 1981:

> An information system consists of an acquisition unit to capture data from the environment, a transmission unit to send it for processing or storage, a processing unit to structure the data in light of user needs, and a utilization unit which is subjected to the process of informing. . . . [An] information system also has a transfer potential in cases where the new information is communicated to another user. (p. 31)

7.10. Definitions about Objects and People: To evaluate

Leake, 1962:

> The main function of science documentation, therefore, would seem to be to arrange ways and means by which scientific information can best be collected, preserved, analyzed, indexed, abstracted, reviewed, translated, and interpreted, for two purposes: (1) that scientists generally might know what is going on, and (2) that people generally might understand something of what science is about, and what it may mean to them in comfort, health, convenience, and satisfaction. (p. 15)

Caldwell, 1970:

> By the nature of the work he is called upon to do, particularly the analysis and assessment of the significance of incoming information to his organization, the information scientist must be very closely in contact with the work his organization, or particular persons within it, are doing, and indeed, he is in a sense directly involved in such work.
> . . . .
> [Information scientists] may function . . . as information assitants for editorial work in journalism, in market research, banks, publishing groups, public relations work, and in programme research for radio and television.

. . . .
[Information science] developed as a result of the need to establish some control over the communications explosion. As it becomes more advanced and sophisticated, it will no doubt increase the control of information to some degree, but one doubts if complete control can ever be achieved--world-wide educational advance is bound to result in ever upward spiralling of information output, so that every extension of control is matched by a more than compensating increase in volume of output. (p. 141)

Brookes, 1974a:

In the information systems as we know them today, the role of the information scientist is to operate the systems thus provided as usefully as possible by organizing the inputs and outputs and using well-established empirical techniques of indexing and searching in a rough and ready intuitive way. In the overall scheme of things, such work plays a subordinate clerical role, practically useful but of limited intellectual interest. But in terms of the biological paradigm, information science lies at the most interesting, the cognitive end of a wide spectrum of information processes or at the top of an extended hierarch of information processes to which it is intimately related. This spectrum ranges through the activities of living forms of increasing complexity of organization, from micro-organisms to man, from the biochemistry of the cell to the behaviour of neural sensory systems, to the neurophysiology of the brain and so the cognitive processes with which our kind of information science is directly concerned. (pp. 107-108)
. . . .
The biological paradigm emphasizes the need to interpret information for its intended users. It points towards information analysis. It suggests that primacy be given to the clarification of problems. (p. 110)

7.11. Definitions about Objects and People: To manage or control

Hattery, 1965:

The newly developing area of information storage and retrieval, sometimes called information science or literature science, in the United States has long been a recognized profession in Europe under the term documentation. (p. 46)
. . . .
There is growing recognition that documentation is a problem of a system of people and machines and information. It is international, interlingual, and interdisciplinary. Documents may take the form of books, journals, microfilm, micorprints, tapes. The system calls for planning and operational management of a high order. (p. 66)

Kochen, 1965:

> "Information science" does not now exist as a scientific discipline. We believe that it may emerge as such, perhaps as a synthesis of concepts and methods originating in automata theory, logic, mathematical linguistics, graph-theory, list-processing techniques, and the theory of cognitive processes. It deals with the principles and facts underlying the analysis and design of information systems. (p. 14)
>
> We interpret the information system of an organism to have the functions of planning the behavior of an organism, of alerting the organism to changes in its environment that signal the need for action, of controlling action toward the implementation of a plan. To function thus, an information system should continually form and reformulate an internal representation of the organism's relevant external world to make it capable of increasingly effective actions (and predictions). (pp. 14-15)
>
> We view an abstract information system to have three major subfunctions: an information storage and recall facility; a problem-solving facility; a facility for comprehension, representation, integration of cumulated information.
>
> . . . .
>
> The first subsystem is a collection of documents and means for filing, searching and retrieving. It is a library. (p. 15)
>
> . . . .
>
> The second subsystem is a collection of (human, possibly aided by machines) agents in roles concerning generation of information (e.g. authors), primary and secondary publication, problem-solving, data-processing, facilitating search by finding unsuspected connections, patterns among data. (p. 16)
>
> . . . .
>
> The third subsystem is a collection of concepts, percepts, ideas, facts, findings, judgments, explanations. These are the raw materials of thought, the units of cognition, with which the information process (from generation to use) is concerned. (p. 17)

Slamecka, 1965:

> There is a continuance of information science (and here the word "science" begins to lose its appropriateness) in the applied domain; here it is concerned essentially with the control of information and its use in society. (p. 16)

Taylor, 1965:

> There are in general five topics or areas of interest to the information sciences.
> (a) The study of <u>information sources</u> from a biological point of view. Here we are concerned primarily with brain-related biological processes. Pertinent studies include neuron nets, articulatory phonetics, and the physiology of vision.
> (b) The study of <u>information channels</u> or of information itself. This area involves not only all aspects of modern linguistics

> and logico-mathematical theories of relevance and classification, but also information theory as it affects coding, language redundancy, and message conversion. From the sociological standpoint, it includes the development of theory and simulation of information channels in specialized scientific subcultures.
> (c) The study of information processes. This ranges from human cognitive processes such as problem solving, concept information, learning, and character recognition to effective computer languages for natural language processing.
> (d) The abstract study of machines. Here we are concerned principally with the theory of networks, servo-mechanisms, Turing machines, and automata theory.
> (e) The study of man-machine communication. We are here interested not only in the physical interface between man and machine, but also in the processes on each side of this interface. . . . This is a total systems approach in which the line between human and computer is purposely blurred. (p. 80)

Lipetz, 1966:

> The field of information storage and retrieval is thus concerned with methods of creating and managing collections of records to facilitate the recovery of pertinent records as they are needed.
> . . . .
> [Records:] durable packets of intelligible information in such forms as handwriting, printing, drawings, photographs, sound recordings and instrument traces. (p. 175)
> . . . .
> Information storage and retrieval is not confined to libraries; it is commonplace in every day life. Correspondence files, accounting systems, inventory-control systems, directories--all are information storage and retrieval systems. So are collections of cooking recipes or of amateur color slides. Even the ubiquitous dictionary, as well as the index to a book or a journal, is an example of information storage and retrieval systems. All these examples are comprised of records to which one may address a variety of allowable questions (that is, questions within the intended scope of the collection) with a reasonable expectation of retrieving a selection of records in response to each question. (p. 176)
>
> Many seemingly different activities can be observed in information storage and retrieval systems. Operationally, however, all such systems employ only three basic processes: the analysis of records, the derivation of new records from old ones and the physical displacement of records over a distance. (pp. 176-177)

Taylor, 1966:

> [The field of information science and technology] may be seen as a spectrum ranging from services, such as libraries, at one end, through systems design in the middle, to basic investigations in supporting fundamental sciences. To draw on a more familiar example, this same spectrum can be seen in medicine and related professions: from services, such as hospitals and their operating

> personnel, through medical practice in the middle, to basic investigations, in biomedicine and allied fields.
> . . . .
> [A] recent paper by this reviewer [Taylor, 1965] defined and discussed education in an unnamed field called "Subject X." This "Subject X" pertains to the theoretical, experimental, and operational study of the interface between man and organized knowledge, and is divided into two areas: information engineering or technology and the information sciences. The former is concerned with the development, design, and operation of information systems, including libraries, indexing and abstracting services, and information and data centers. The latter explicates systems and their components and is concerned with the basic sciences underlying system development: neurophysiology, linguistics, mathematics, logic, psychology, sociology, epistemology. The parallel from medicine is obvious. (p. 17)

Segel, 1967:

> [There] is a clamoring for Information Engineering which is the art that will supply workable solutions for those who need Scientific and Technical Information Centers, Management Information Systems, Data Control and Accounting, and Project Management Systems.
>
> What is "Information Engineering"? . . . Today, engineers are engaged in the use of arts and the application of sciences in its many diverse fields. One of these is in the field of documentation. . . .
> . . . .
> [The] Information Scientist . . . is engaged in the science of systematic study to enlarge man's knowledge, to develop it, and to disseminate it; and . . . the Information Engineer . . . utilizes the art of being a skilled workman to implement and operate the ideas taught by the Scientists. (p. 13)
> . . . .
> [The information engineer] cannot act alone but must coordinate with the Scientist and the User. He is the middle man who develops and delivers to the User a workable system. He starts from the State of the Art communications from the Scientists and he finishes with the delivery of the workable system to the User. (p. 15)

Yovits and Ernst, 1967:

> My contention, then, is that information systems and command and control systems are very similar and, perhaps, identical types of systems. Information must always be an inherent part of any command and control system and command and control must always be an integral part of any information system. It would be very appropriate to talk then of a command, control, and information system or, perhaps, an information, command, and control system. (p. 281)
> . . . .
>
> When one is discussing "Command and Control" he is talking about "Command and Control" in order to carry out or generate

some set of observable actions. So, of course, one cannot talk about command and control without discussing a system of some sort. . . .

Further, what is the fundamental resource which the commander or decision-maker uses in order to make his decisions? Information. (p. 280)

. . . .

[Information] is data of value in decision making. . . . For completeness, data, as defined by Webster's, "are things known or assumed; facts or figures from which conclusions can be drawn." (pp. 280-281)

Data, then, result from observable actions. Or more specifically, data are transformations of these observable actions. Information is that set of data which is useful in the making of some decision or decisions. Accordingly then, information too is inherently involved in the decision making process which must generate some observable actions.

. . . .

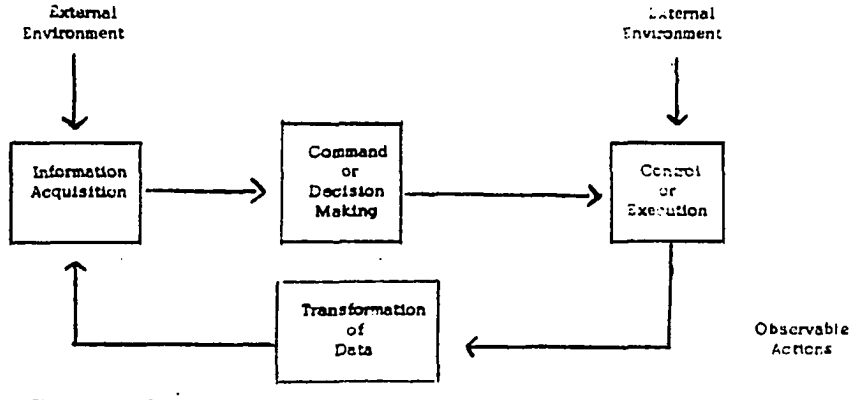


Figure 1. COMMAND AND CONTROL SYSTEM MODEL OR INFORMATION SYSTEM MODEL (p. 281)

Ranganathan, 1968:

By 1948, we had begun to think in terms of documentation--an essential supporting service to conserve research, production, and managerial potential. (p. 158)

Caldwell, 1970:

The development of interest in information science is almost wholly due in the first place to the very rapid post-war expansion of output of information, in printed and many other forms, principally in the fields of science and technology, but increasingly in the social sciences also, especially over the last decade or so. The significance of effective control and exploitation of this increasingly unmanageable flow of information in relation to research, and the economic importance of research, especially scientific and technological, to individual organizations and countries, and, indeed, to humanity in general, naturally led to efforts to establish some kind of control. Crude and primitive as some of these earlier attempts to get to grips with the problem may now seem, they

represented the beginnings of information science, although perhaps the term "science" was barely justified in retrospect.

Not surprisingly, perhaps, much of the earlier work was aimed at establishing some kind of control or registration of the output, which, if achieved, could lead to a system of tracing and recall of desired data as necessary. The world of business having produced much equipment for handling business records and finance, thought naturally turned to this form of mechanized approach to the information problem, and many and varied have been the resulting pieces of ironmongery-cum-electronics-cum-optics. (p. 137)

Debons, 1971:

By and large, the terms "command and control" when used in the conjunctive form are military terms and may be considered synonymous to military science in the broad sense, inasmuch as the terms imply the full spectrum of directing and correcting/adjusting functions underlying military operations at large. The planning, monitoring, analyzing, assessing, directing, and manipulating of resources are implied. (p. 320)

. . . .

The term command and control systems signifies environments where data are gathered to direct and regulate resources to meet specific operational objectives. When command and control systems are established for the major purpose of acknowledging resources (men and material), with the employment of such resources being a secondary consideration, such systems are often referred to as management information systems. (p. 321)

. . . .

[The] technical and scientific areas pertinent to command and control problems . . . [are referred to] as constituting Systems Sciences and [are] linked . . . to progress made in electronic data processing. Thus, command and control became defined within the sphere of "Information Sciences," "Organization Sciences," "Computer Sciences," and Systems Theory. (p. 324)

. . . .

Command and Control imply an environment consisting of men, machines, and procedures which enable the manipulationg and handling of data in support of the formulationg and verification of a decision. (p. 325)

. . . .

Several elements serve to define the command and control environment. . . . (1) the event world that represents the physical states and the energy emitted from such states which identify their existence and presence; (2) the elicitation agent which may be the human (viz. eye, ear, smell, etc.), or physical sensor (mechanical or electronic); (4) data processing elements (computers, typewriter, punchcards, etc.); (5) data depiction element (CRT, TV, hardcopy printout, etc.); and (6) the decision agent (man). (p. 326)

. . . .

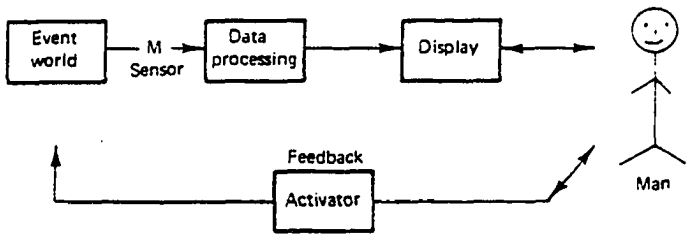


FIG. 1. Depiction of the essential components of a command and control (information) system. (p. 326)

Yovits and Mathis, 1971:

> [We] consider information science to be a broad discipline concerned with the generalized study of information flow. Information is defined as data of value in decision making and a "generalized information system" of virtually universal applicability is accordingly established. We then define computer and information science to be the study of information processing and information flow in this generalized system. (p. 118)
>
> . . . .
>
> Although this model was first developed to describe a military command and control situation, it was soon recognized that this model is much more general and highly descriptive and has virtually universal applicability as well. This model covers all aspects of information including its generation, collection, classification, transmission, and utilization. . . . . (pp. 119-120)
>
> This model has four main subdivisions referred to as functions. These are Information Acquisition and Dissemination (IAD), Decision Making (DM), Execution (E) and Transformation (T). Inasmuch as the central function of any system of this type is decision making we consider this to be most important. Information must be used for something. Information is seen to be used in making decisions and is seen to be the only resource available to the decision maker. (p. 120)
>
> . . . .

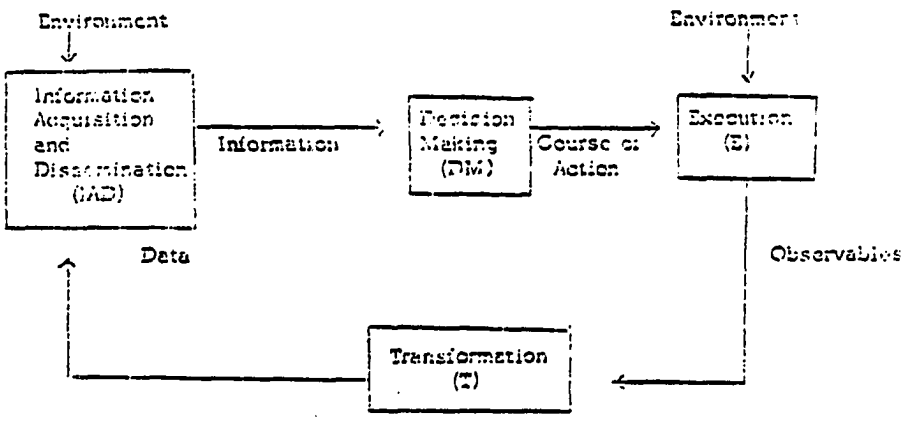


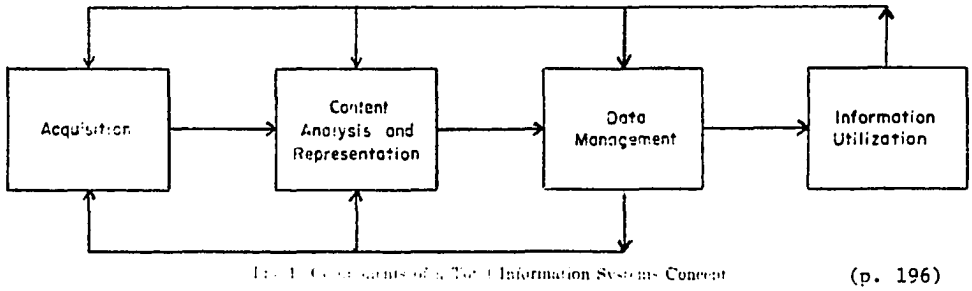
Figure 1 Generalized information system (p. 121)

Fairthorne, 1972:

> The function of . . . Informatics in general, is not the pursuit of knowledge as such, but of knowledge of what people have had to say. In short, Informatics is concerned with the management of messages, not with their creation or application.
>
> One key task of message management is to isolate some fragment of a text or diagram or record without compelling the reader to hunt through all of it.
>
> . . . .
>
> [This] is called Data Retrieval, an activity that aims to satisfy the very common requirement for a part of a text or record as opposed to a request for the whole of it. (p. 99)

Montgomery, 1972:

> [Information science] is concerned with all aspects of the communication of information, . . . (p. 195)
>
> . . . .
>
> The concept of a natural language information system can be specified very simply in terms of the four components of acquisition, content analysis and representation, data management, and information utilization, . . . The acquisition component includes the selection of an appropriate subset of the universe of information and the introduction of this subset into the particular system. Information records acquired by the system may be documents or document surrogates or subsets, facts or data items--all are "packages" of natural language information differing in size, and, in some respects, in their internal construction. (p. 196)
>
> These information records must then undergo a process by which their content is analyzed and represented in some standard form, which is accepted for processing by the data management component. The user interacts with the system through the content analysis and representation component, which passes his requirements to a data management executive that provides responsive output. The utilization of this information by the requestor is represented by the fourth component, which may itself involve a complex subsystem for storing and processing data. This component impacts on the components of the main system through a feedback loop. Another feedback loop links information generated by the data management system to the components of acquisition, content analysis and representation. (pp. 196-197)
>
> . . . .
>
> [The] data management executive is the automated file clerk, . . . (p. 198)
>
> . . . .



[illegible] Information Systems Concept (p. 196)

Licklider, 1973:

> [The] central problems for information scientists to attack are problems in the organization and understanding of information and . . . the essential methods for attacking those problems involve the "objectification", in the form of computer processes, of organization and understanding. (p. 166)

Otten, 1973:

> It is suggested that the scientific study of information should consider the information transfer process as its basis. Building on this premise, a conceptual model is proposed as the framework for the development of theories on information. The model is general and applies to a wide variety of information systems ranging from communication systems, man-made machines, and man-machine systems to man simply interacting with his environment in the context of his cultural background and past experience. . . .
>
> . . . .
>
> We define a system as the recipient of "information". A system can be any information-processing structure, living or man-made: computer, living organism, man himself or an organization. "Information" may be regarded as what is needed for the control and proper functioning of a physical system in its environment that functions in the pursuit of its goals, including its survival. (p. 127)
>
> . . . .
>
> The proposed conceptual model pictures "information" as system-specific interpretations (transformations) of stimuli. "Information", according to this concept, is manifested by an internal change in the state of the system which can (but does not have to) be reflected by external changes or actions of the system. (p. 145)
>
> . . . .

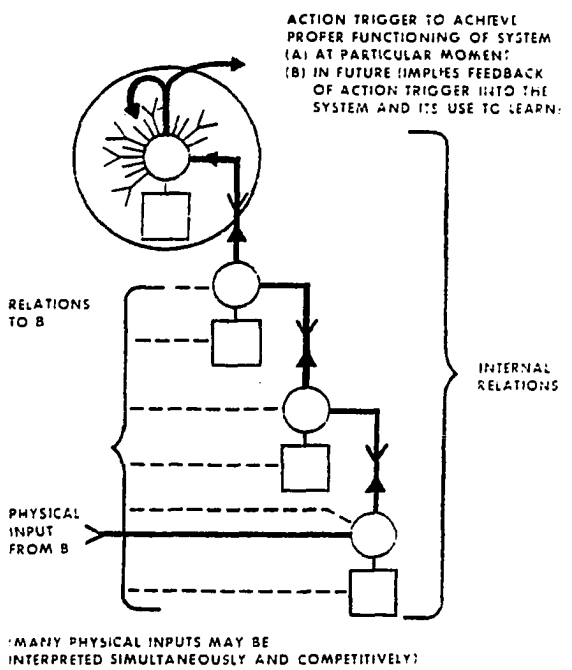


Figure 12 - General Model of Adaptive Systems Interaction With Environment (p. 146)

Rathswohl, 1973:

> This dissertation proposes that informatology's 'main contribution' to information science be reconceptualized around two interrelated tasks that directly derive from the considerations of critical metascience. The first task involves the design of an adequate critical framework for information science; such a framework would apply not only to information science per se but would relate also to science and society as a whole. This critical framework would take the form of a theory of the relationship of information generation and information utilization. The second task of informatology would be to actually employ the critical framework to critique information science activities. (pp. 250-251)
>
> . . . .
>
> [Informatology is conceptualized] as a critical metascience with the practical intent of facilitating the information system design process.
>
> . . . .
>
> The proposal is for a critical science of information--informatology--which would itself be inquiry into the legitimacy of the fundamental principles of information. (p. 255)

Rathswohl, 1973:

> The purpose for which information systems are designed was described . . . as an attempt to bridge a gap between information production and information utilization. Information production is equivalent here to technical improvements in the information on which utilization is based, utilization referring to knowing activity in general. We see ourselves designing information systems as means for improving man's ability to make sense of a complex world. (p. 28)
>
> . . . .
>
> Information science . . . charges itself with meeting the information needs of people. (p. 42)
>
> . . . .
>
> We have argued that information science has traditionally viewed its subject matter as the problem of linking information and action and that the purpose for designing information systems has traditionally been to effect such a linkage. Indeed, information systems have often been conceived as the actual process of information production and utilization, as in the case of command and control. As a general statement, information science has traditionally seen its task as designing processes that would not only guarantee 'better' information but also guarantee 'better' action, e.g., decision-making and planning, based on the use of that information. (p. 83)
>
> . . . .
>
> [Information science] has typically seen the function of information systems as serving a linking function, specifically a conveyor or carrier function of taking information from expert sources and passing it on to non-expert potential users. (p. 110)
>
> . . . .
>
> [The] legitimate interests of information science concern the understanding of the system of information flow at all levels in society. (p. 113)

Watson et al, 1973:

> [We] are not challenging the notion that there exist specialized skills in the creation of information retrieval systems, but we do challenge the notion that these skills can be segregated and exercised independently of skills in the subject field they serve. Indeed, we are equally suspicious of leaving the structuring of documents to any closed group of "experts" from within the discipline. The development of information services should be an active and on-going partnership between those who possess the skills of information science and those who understand the discipline within which the documents are written. (p. 273)

Whittemore and Yovits, 1973:

> In our formulation we adopt the definition that information is data of value in decision-making. . . . An implication of this definition then is that information is used only for decision-making and that the decision maker has only the resource of information available to him. Thus, information and decision-making, which might be defined to be purposeful activity or intelligent behavior, are very closely bound together, if not totally inextricable. (p. 222)
>
> . . . .
>
> Decision-making is a process; a decision is an event. As a process, decision-making includes all the intellectual activity that precedes and eventually culminates in the decision itself. The very essence of a decision situation is the requirement to make a single choice from among a set of at least two possible alternatives or courses of action. The entity (either man or machine) required to make this choice is the decision-maker (DM). The view of decision-making suggested here is a general one. As such, it includes, at least in principle, such choice behavior situations as response-selection and attitude-formation. In a general way we may equate decision-making to problem-solving. (footnote 1, p. 224)

Debons and Montgomery, 1974:

> Management information systems contain the same ingredients as command control systems--planning, operating, and control of resources, personnel, and equipment. The time dimensions and results of system operations may be different, but the essential components are the same. In all so-called information systems there is an acquisition component; a transmission component that transports the data from the acquisition level to a processing station, where a data manipulation or storage function is carried out; and a set of users--in most cases, the decision makers or problem solvers. In both command-control systems and management information systems, displays are the interface between the processing element and the user. As such, the display can be considered a transmission device, enabling the transportation of the processed data from the computer (or other processing device) to the sensory and cognitive mechanism of the user. (pp. 40-41)

Dumas, 1975:

> Some of the practical implications of the new "Information Science" as applied to organizations have been concealed by the current assimilation of "information system" with "computer system". Recent development of powerful data base management systems gives rise to a new class of organizational problems that management had previously ignored. Thus, it is now quite fashionable to speak of "managing the data resource", of "data administrators", of "information middlemen", and the like.
> . . . .
> Along with the general properties of systems, information systems are evolving toward formalization, and differentiation. Within such a framework, computer system is a formalized sub-system of the information system. The process of formalization is now shaping new functions, that are related with information handling, but are not included within the classical systems analyst's or computer scientist's scope. As those functions are presently evolving, it is proposed to give them the generic title of "information management".
> A few tasks of "information managers" are identified from empirical evidence already available. These are (1) the conception of the structure of the data base, and management of its evolution, (2) the control of the form of accessed data, (3) the interface between furnishers, users and technicians, (4) the control of the legitimate use of data, and (5) the assistance to the user. (p. 4)

Fry, 1975:

> Efficient information processing and management has information storage and retrieval as a major component but includes as well the integrated cycle of communication from generation to utilization. (p. i)

Kubátová and Fogl, 1976:

> Information science extracts from among the many processes occurring in human society with all its diversity and dynamism of development the process of circulation of specialised information and studies this process--which constitutes one of basic preconditions of the development of society--from the standpoint of optimising processes of decision-making, planning and management. (p. 24)

Docuprocessing Publications, 1977:

> Information management is most broad in connotation as it encompasses all information handling methodologies, economics of information, information systems analysis, information networks, personnel supervision, information privacy, information science, administration and information policy. (p. 3)
> . . . .
> In the final analysis, the successful information manager will be the one who consistently makes available the right information at the right time. This will happen through the planning, design, and coordination of better communications processes which generally will be achieved by applying a systems approach. (p. 4)

Neveling and Wersig, 1977:

> The second activity is information science, that is developing methods which allow efficient design, construction, and use of information systems as well as the organization of information processes. Here the following specific tasks are envisaged: analysis, design and implementation of information systems (computerized or non-computerized); management of large information systems and information networks; teaching in the field of information and documentation; basic and applied research; consultancy in information problems (information flow); and planning, public administration, policy-making for information and information systems. (pp. 214-215)
>
> . . . .
>
> Information scientists are people who in their work apply principles, experiences, methods and theorems of information science to information phenomena with the ultimate goal of improving information conditions, thereby contributing to the body of knowledge of information science. (p. 215)

Weiss, 1977:

> Information science can be defined as that set of principles and prescriptive rules dealing with the organization, maintenance, and management of bodies of scientific, technical, and business information used in decision-making. Information transfer then can be viewed as a communication problem. It is concerned with improving the communication of recorded information among three types of individuals or groups: (1) the originator of information; (2) the processor of information; (3) the user of information. Thus, information science must be an organized body of knowledge based on explanatory principles which seeks to discover and formulate in general terms the conditions under which facts and events relating to the generation, transmission, and use of information occur. (p. 2)
>
> . . . .
>
> Information management refers to efficient bibliographic organization and inventory control. Knowledge management refers to the principles, policies, and practices for guiding and controlling, in a socially and technically optimal sense, the generation, distribution, consumption and effect of this resource [knowledge]. One major, visible result of this change will be new generations of information systems which will permit interaction between man and stored knowledge, rather than between man and stored document descriptions. Finally, it must be recognized that these systems will operate in a networking environment. (pp. 3-4)

Borko, 1978:

> An information system is an organized combination of human and capital resources which results in the collection, storage, retrieval, communication and use of data to support management decision making. The design of information systems is one of the most challenging and creative tasks in our society. To meet this challenge, a new discipline has emerged which is dedicated to the analysis and design of information systems. It is variously called information science, systems science, informatics, or systems analysis. (p. 383)

Debons, 1978:

> To fill the void that now exists between the user and the resource requires a specific set of competencies. In my view, what a user needs is not access to data and information, but rather a skillful aid in the manipulation and organization of data that can be accessed and made available. (p. 485)

Kubátová and Janoš, 1978:

> We base this contribution on the concept of information science as a social scientific discipline which studies the area of specialised information [specialised information = professional information] and its function in the management of social processes.
> . . . .
> [Information science] separates the process of circulation of specialised information and regards it from the standpoint of how to otimise the processes of decision-making, management and planning. On the basis of available knowledge bearing upon the generation, transmission, transformation and application of specialised information in society, it studies the causes and the regularities of information problems, seeking at the same time appropriate methods and means for their solution. (p. 85)

Rozsa, 1978:

> Firstly, informatics may be understood as a highly comprehensive and complex concept of the theory and practice of scientific information. This embraces the totality of activities involving library, documentation and the automation of information. Secondly, informatics may be regarded as a general application of cybernetics. As understood in the first case, information syntheses are ranking among the new trends of informatics. (p. 103)

Koblitz, 1979:

> It is all too often the case that we are unable to understand each other totally and with ease in questions related to documental information practice and theory.
> . . . .
> These difficulties already appear in connection with naming and definition--if indeed the latter exist at all--of the utility area of socially organized information, which in some countries is designated as "documentation", in others--"information and documentation" (or, as in the present article, as "documental information"), and in still other countries, as a rule, "scientific-technical information", etc. The same can be said of the naming and definition of the science concerned with this field: some people call it "documentalistics", others (including us) call it "information and documentation science" or "information science", still others--"informatics". (p. 9)

Saracevic, 1979:

> "Information services for science and technology" was the hallmark of information science in the 1950s and 1960s. The broadening of this original domain in the 1970s is characterized by terms and phrases such as: information services for..."policy", "management", "decision making", "developing countries", "coping with human needs", "neighborhood",...and even in Kochen's conception: for "wisdom". The search is on to formulate a problem domain of information science in the emerging postindustrial society...envisioned to be in relation to management of man's knowledge as a social and national resource. (p. 6)

Tague, 1979:

> In this article, information science is defined in terms of its use. . . . [It] has at least these four aspects: the application of new technology, especially computers, telecommunications, and nonprint media, to information processing; the application of analytic and quantitative techniques to the development and evaluation of systems and institutions involved with information; principles and systems for the control and organization of information--indexing, abstracting, classification, cataloging; a scientific--i.e., research-based--search for generalizations and laws about information and its use. (p. 90)

Debons, 1981:

> Information professionals are concerned with information systems. Information systems are environments (i.e., organizations, institutions) of people, technology, and procedures that facilitate (a) the generation of new knowledge, (b) use of knowledge, and (c) transfer of knowledge for the purpose of solving problems and making decisions. Retrieval of documents, storage of records, indexing, cataloging, and so forth, are considered components of such systems.
>
> Information is the result of a human process, of which one can find evidence in a physical record--the record being the commodity. Information systems facilitate the human processes through the acquisition, use, and dissemination (transfer) of the commodities, but their essential objective is problem solving and decision making.
>
> Based on these postulates, the following definition of an information professional was established: An information professional may be differentiated from other professionals who may work with data by the fact that she/he is concerned with the content and therefore with the cognitive/intellectual operations performed on the data by the end-user.
>
> Five main classifications of function were proposed for the study:
>
> People who analyze the requirements and then design/implement such systems (information systems analysts and designers)
>
> People who help end-users in their jobs through the use of such systems (data/information preparation on behalf of others; searching for data/information on behalf of others)
>
> People who manage such systems (managing information operations, programs, services or data bases)
>
> People who research such systems
>
> People who train others to use such systems. (p. 247)

Debons, King, Mansfield, and Shirey, 1981:

> [The] first task of any research project [to survey the population of information professionals] would be to define a set of "information functions."
>
> . . . .
>
> [A] conservative approach was taken which excluded creators and primary users of data and information, and concentrated on those professionals involved in data and information work <u>on behalf of others</u>. Hence a concern with professionals involved in the design, creation, operation, and evaluation of <u>information systems</u> (manual and automated): those who analyze information requirements and design and operate systems to meet these requirements, as well as helping users to benefit from such systems; those who manage and control the systems; those who do the research, development, and evaluation needed to maintain such systems; and those who educate and train others to do any of the foregoing. (p. 4)
>
> . . . .
>
> A function-based approach to the designation of information professionals meant crossing disciplinary boundaries. It was expected that information professionals would be found in fields as diverse as computer science, technical writing, financial administration, librarianship, and so on. (p. 5)
>
> . . . .
>
> The kind of data and information handled by information professinals includes textual data (e.g., books, journal articles, reports, etc.) and numeric data (e.g., management information, engineering tables, survey data, etc.). It also includes special forms of information such as audiovisual materials and cartographic data, as well as secondary information such as bibliographic citations, catalogs, and indexes of primary text information, numeric data files, audiovisual materials, or cartographic files. (p. 7)
>
> . . . .
>
> An information professional may be differentiated from other professionals who may also work with data by the fact that s/he is concerned with <u>content</u> (the meaning applied to symbols) and therefore with the cognitive and intellectual operations performed on the data and information by a primary user.
>
> . . . .
>
> An information system consists of an <u>acquisition</u> unit to capture data from the environment, a <u>transmission</u> unit to send it for processing or storage, a <u>processing</u> unit to structure the data in light of user needs, and a <u>utilization</u> unit which is subjected to the process of informing. . . . [An] information system also has a <u>transfer</u> potential in cases where the new information is communicated to another user. (p. 31)

. . . .

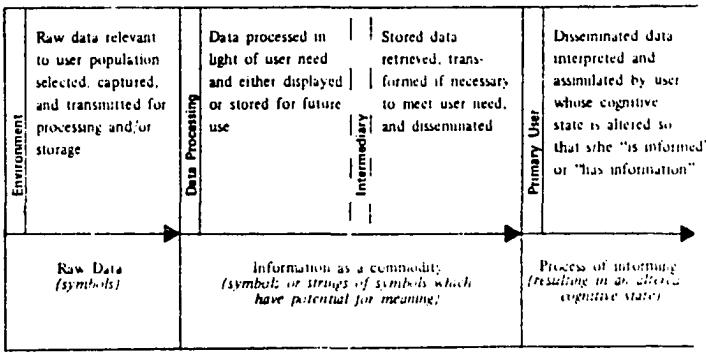


Figure 3. An information system (p. 30)

Svenonius and Witthus, 1981:

> Indeed, in its seeming ability to provide direction and purpose the view of information as a commodity of value could be regarded as paradigmatic.
>
> Associated with the concept of information as a resource is the belief that information can be managed and therefore that productivity can be increased. Managing information in an organization means harnessing information technologies, reducing paperwork, and rationalizing the flow of information. The formalization of functions and activities, characteristic of post-industrial society, applies to the management of information. (p. 292)
>
> . . . .
>
> An information manager, or an information resource manager, is viewed as a generalist who has management training and an understanding of information technologies. (pp. 295-296)
>
> . . . .
>
> The information management paradigm is a framework within which systems personnel, records managers, and special librarians conceptualize role change. Role change implies a movement forward and, often, a broadening of horizons. (p. 296)
>
> . . . .
>
> The information management paradigm, with its focus on the cost-effective management of information to improve business productivity, may be at odds with certain professional ideals. (p. 306)
>
> . . . .
>
> The information age is characterized by an information-centered economy. Signifying that we have entered this age is the emergence of the information management paradigm within which the management of information is linked to improved business productivity. (p. 307)

7.12. Definitions about Objects and People: To mechanize

Taylor, 1963a:

> At the operational level, the subject, within the focus of librarians, is concerned with the development of man-machine systems for the optimum utilization of specialized knowledge, usually called information retrieval systems. It could be concerned with machine translation or any similar approach. At this level, it cuts across such technologies as electrical engineering, computer technology, management science, librarianship, and operations research.

Wilcox, 1964:

> Fortunately, however, more and more leaders of modern technology are coming to realize that these three fields [automatic control; digital computing technology; and methods of emulating with machines many of the functions formerly ascribed solely to human intellect, such as general pattern recognition, game playing, theorem proving, and learning] are in reality all specialties of one macro-discipline which we choose to call the computer and information sciences. (p. v)

Atherton, 1965:

> The intention [in using the term 'informatology'] was to avoid the term documentation, which connotes attention to documents. Now that the emphasis in our field is on information, it was considered appropriate to coin a term with that connotation.
>
> The term informatology denotes that work and research within the field of information processing which combines intuitive and algorithmic procedures where computers are used as a supplement to the human intellect. Treatment of subsets of intellectual activities which do not depend on intuition are in the domain of the informatologist. He would study an activity, such as classification, for example, which generally does not suppose the use of computers or logical methods, in order to study its intuitive character and ascertain whether such activity (a series of intuitive sets) can be formalized and defined as subsets of the larger system which would employ computers. The goal of the informatologist is data processing and development of know-how about when and when not to use the computer. (p. 126)

Tell, 1965:

> The word "informatology" was coined to denote the research field within information processing which combines intuitive and algorithmic procedures. Computers are used merely as a supplement to the human intellect. Informatology will handle both those subsets of the information process which are not dependent on intuition or knowledge and those in which it is a prerequisite that intuitive procedures are included. The purpose is to arrange the procedures in such way that the intuitive subsets are distinguished from those which might be formalized, and that the

two kinds of subsets are regarded as well-defined components in a total system.

The treatment of subsets of intellectual activities which do not depend on intuition is in the domain of the "informatologist." He studies an activity like classification, which generally does not presuppose the use of computers or formal logical methods, in order to analyse its intuitive character and ascertain whether this activity (a series of intuitive sets) can be formalized and defined as subsets of the larger system, which would then employ computers. (p. 43)

Gorn, 1967:

A new discipline is emerging which I have called, for want of another name in plain English, Computer and Information Sciences.

. . . .

[It] required a model of human activity combining elements of both cybernetics and pragmatism. The point of view is therefore called Cybernetic Pragmatism, . . . (p. 433)

. . . .

One of the central areas in this curriculum [of the computer and information sciences at the University of Pennsylvania's Moore School of Electrical Engineering] is the study of the synethesis and analysis of mechanical languages and their processors. In this study it soon appears that one cannot separate for very long the concept of a language as a set of symbolic expressions from the concept of interpretive processing of such expressions. . . . [This] interdependence of symbol systems and the process of interpreting is just as valid for simple notational systems, or for machine programming languages; . . . (p. 434)

. . . .

[A] general principle of cybernetics [is] . . . the study of communication and control in animals and machines, and that . . . could be broadened to include the study of any organisms; that among such organisms we could include any systems containing a communication subsystem and a control subsystem; that such systems could also include men and machines; that they therefore subsume such entities as families, ethnic groups, armies, corporations, and even systems such as technologies, cultures, files of information, disciplines of knowledge, languages, and educational systems in both a narrow and a broad sense; . . . (p. 439)

. . . .

[One] of the great benefits of the study of information science is an insight into what is or what is not computable, what is and what is not mechanizable. (p. 451)

Tou, 1967:

The conception of computer and information sciences arises basically from the use of modern computer and information processing technology to extend man's intellect. (p. vii)

> The decision process . . . exists as a set of rules which maps the input information into a form suitable for implementation, or as it is presently represented, decision execution or simply control. (p. 286)
>
> . . . .
>
> [The] steps towards identification of the inference and decision process are, in fact, initial steps towards the automation of decision-making. (p. 287)
>
> [The] centrality of decision calls attention to human or human-like functions. We believe . . . that the distinction between the two may be artificial. . . . Thorough understanding of the human function such as we propose may serve as the basis for automation of his function. (pp. 287-288)

Rice, 1969:

> Many believe that the processing of "information" is the central theme of computer science. Others believe that this is not the case even though they recognize information processing as an important area. The difference of opinion arises not so much from the facts as from the interpretation of the words "information processing."
>
> If we take a broad interpretation, we could include such things as:
>
> 1. The execution of algorithms. We take the information about how to solve a problem or accomplish a task and act upon it.
> 2. Language translation and programming. We take the information expressed in one language . . . and reexpress it in another. . . .
> 3. Problem solving. We take the information (both specific facts and theory) about a problem and manipulate it until we obtain the required information about the solution of the problem. (p. 195)
>
> . . . .
>
> However, if we take a narrow interpretation, then we would not include the three items above. We would interpret "information processing" to be concerned with the manipulation of more "specific" facts. This is sometimes called data processing. We would include such things as:
>
> 1. Sorting and classifying. . . .
> 2. Ordering and merging. . . .
> 3. Correlating. . . .
>
> It is not really important which of these interpretations we choose. (p. 196)

Salton, 1969:

> One may ask why the field of information science should be of interest to students in Computer Science and what, if anything, computer scientists would contribute to this area. A short and somewhat simplified answer would cite the role of computers as information processing devices and express the hope that computers could eventually be used to carry out all information processing and dissemination tasks selectively, rapidly, and cheaply. (p. 111)

> Machines, especially radical new developments in computer, communication, and information processing systems, have made possible revolutionary gains in data acquisition and data manipulation over time, over space, over human limitations of reaction and responsiveness, over manually-inaccessible conditions, and more especially over human limitations of span-of-attention, consistency, and objective judgment.
>
> . . . .
>
> Today, the challenge is . . . how can machines substitute for, or at least provide effective aid to, the air traffic controller, the professional meteorologist and the laboratory scientist, the architect or city planner, the reference librarian, the student or the professor? (p. 2)

Otten and Debons, 1970:

> All information processing operations can be performed by digital computers. To achieve this general information processing by computers, the processes have to be decomposed into a number of elementary operations. It is this set of elementary operations that constitutes the building blocks for all complex information processing in nature or machinery.
>
> . . . .
>
> The ability to translate complex information processing tasks into sequences of elementary operations may be accepted as evidence for the fundamental nature of information and of information processing. (p. 90)

Hays, 1971:

> Documentation is a new art today. After some years of emphasis on microforms, you have switched to the computer as medium for storage and circulation of knowledge. . . . I should not have chosen 'information science', but still... (p. 5)
>
> . . . .
>
> The new art of documentation--I might be able to call it 'information technology', if that would help--depends on the computer, but only as a clerical machine. Sortin, storing, formatting, counting, printing--such are the jobs given to the automatic information processor by the new art.
>
> . . . .
>
> The computer is ultimately capable of storing ideas--paradigms, theorites, analyses, formulations, principles--and changing them as theoretical discoveries come in. (p. 6)
>
> . . . .
>
> [If] a computer can take part in a conversation, it must have a supply of little tiny theories, and a method for applying some of them. Tell it some facts, and it can riffle its pack of explanatory principles, suggesting some that might explain--that is, give a unified account of--the facts. A machine that could do that much would become a colleague, possibly interesting to discuss problems with.
>
> . . . .

. . . .
If the machine can weld together a community by keeping their factual information up to date; if it can test for consistency among theories; if it can suggest new theoretical explanations--and a metalinguistic machine should ultimately be capable of all those acts--then it is a philosophical machine.

The future of information science must have computers in it, but that is not a blueprint for information technology. The sociology of knowledge will have greater effect on information system design in the future than in the past. (p. 7)

Licklider, 1973:

[Information] must arise and develop and live within a technology, . . .
. . . .
[The] central problems for information scientists to attack are problems in the organization and understanding of information and . . . the essential methods for attacking those problems involve the "objectification", in the form of computer processes, of organization and understanding. Let me be clear that I am not suggesting that information science must wait for the day when computers are intelligent enough to create a science man cannot create. . . . I am saying that a set of problems is beginning to form as efforts are made to apply computers in the intelligent organization and understanding of information, that . . . the problems constitute the subject-matter core of what information science will or should become.

Nor do I mean to say that computer technology constitutes the only technological base for information science. Communication technology also contributes to the base. (p. 166)
. . . .
If storage and processing belong to the computer field, transmission belongs to the communication field, . . . [There] has been progress in the joining together of computer systems and communication circuits to form computer-communication networks. (p. 168)

In my assessment, computer-communication networks are vitally important . . . for the development of an important and, indeed, essential information science. They can make it possible for people and programs to interact with one another and with organized stores of information. . . . In short, computer-communication networks can greatly improve the intellectual-informational world in which people live and work, but, of course, computer-communication networks cannot do any of the things I have suggested without human effort, and the necessary, essentially human effort is part and parcel of the development of a technology-based information science. (pp. 168-169)
. . . .
[What] the situation requires is also a use- and user-oriented information science. That requirement stems from the fact that so much of the forward thrust of computers and networks has come from inside, . . . (p. 169)

7.13. Definitions about Objects and People: To study

Taylor, 1965:

> [There are] two major areas of an as yet unnamed subject, which in this paper is labeled "Subject X." This "Subject X" pertains to the theoretical, experimental, and operational study of the interface between man and systematized knowledge.
> . . . .
> In very broad terms, we are concerned with the interface between man and stored knowledge.
> . . . .
> The two divisions of "Subject X" are the information sciences and information engineering. (p. 77)
>
> The information sciences are based primarily on the applications of mathematics to the phenomena of message generation, storage, organization, structure, and transfer. Their study is . . . concerned . . . with the explication of both system and environment. (pp. 77-78)
> . . . .
>
> The second major division of "Subject X" is that of information engineering (technology?). We are here concerned with the design, operation, and management of systems for handling messages or packages of messages, frequently called documents. These systems include libraries and their subsystems, information and data centers, publishing and dissemination, management information; and all the offshoots of these such as indexing and abstracting, selective dissemination of information, and even the semi-formal systems that have evolved within a subject field. . . . (p. 78)

Segel, 1967:

> [The] Information Scientists . . . is engaged in the science of systematic study to enlarge man's knowledge, to develop it, and to disseminate it; and . . . the Information Engineer . . . utilizes the art of being a skilled workman to implement and operate the ideas taught by the Scientists. (p. 13)

Yovits, 1969:

> [Information science is] the branch of study concerned with the properties of information flow in a generalized information system. (p. 374)

Boldis, 1970:

> [Informatics] is a scientific discipline concerned with the complex study of the essence of specific scientific information systems with the aim to enhance the temporal and qualitative effectiveness of the scientific-informative process. (p. 4)

. . . .

If information, systems of communication in society and people are considered to be the objective nucleus of informatics, one is fully entitled to state that informatics has essentially a social-scientific character and belongs to the system of social sciences. (p. 5)

Foskett, 1970:

'Informatics' is developing as a new discipline, in that, for the first time, people are now studying the behaviour of information itself and the properties, or 'morphology', as Fairthorne puts it, of information flow. (p. 343-344)

. . . .

Whatever name [for our developing profession] may ultimately win approval does not particularly matter; it is the content and the purpose that count: the social organization of the products of individual minds so that the whole of society may benefit, that there may be added a quality to life . . . beyond the mere fact of life. (pp. 365-366)

Goffman, 1970:

The aim of a discipline of information science must be that of establishing a unified scientific approach to the study of the various phenomena involving the notion of information whether such phenomena are found in biological processes, human existence or the machines created by human beings. Consequently, the subject must be concerned with the establishment of a set of fundamental principles governing the behavior of all communication processes and their associated information systems.

It is very important to distinguish between processes and systems. . . . In general, a process is a time dependent phenomenon, i.e., a sequence of actions leading to some result. A communication process is thus a sequence of events resulting in the transmission of information from one object to another. The first object is called the source and the latter the destination. A system . . . is the mechanism by means of which a process is realized. More precisely, a system is a collection of elements interacting to perform a specific function for a specific purpose.

Systems whose functions are the carrying out of communication processes are known as information systems. Such a system will take the information at the source and operate on it in some way to produce a signal suitable for transmission on some channel to a receiver at the destination. . . . [A] primary task of information science is the study of the properties of communication processes which may then be translated into the design of the appropriate information system for a given physical situation. . . .

The major difficulty in any scientific treatment of communication processes arises from the fact that the concept of information, although intuitively understood, can neither be formally defined nor precisely measured. However, when considering processes whose outcomes are governed by the transmission of information, the information transmitted can be evaluated in terms of these outcomes. (p. 591)

. . . .

. . . .

The fundamental notion underlying the behavioural problem in communication is the notion of effective contact between the information source and the destination. For example, effective contact is clearly the governing factor in the outcomes of the two most familiar communication processes, namely the transmission of knowledge and the transmission of disease. It is thus not surprising to find a striking parallel between these two processes. (p. 592)

Goffman, 1970a:

Information science aims at being a unified scientific approach to the study of the various phenomena connnected with the notion of information. These phenomena can be found in biological processes as well as in human existence and the machines created by human beings. Thus, the subject has evolved as a synthesis of methods drawn from the traditional disciplines for the purpose of studying the multivaried aspects of information flow within a population of objects be they human beings, micro-organisms or machines. Information science, therefore, is essentially concerned with the principles underlying communication processes and their associated information systems. (p. 726)

. . . .

Because the principles underlying the spread of infectious disease also govern the diffusion of information and the spread of knowledge, a communication process can be represented as an epidemic process. (p. 728)

Otten and Debons, 1970:

[Information science] is understood as the evolving metascience of information. (p. 94)

. . . .

This anticipated metascience can be view as the science of information (or informatology). Informatology can be defined as the study of the fundamental principles underlying the structure and use of information. (p. 92)

. . . .

Information, like energy, can be viewed as a fundamental phenomenon. Energy is manifested in a variety of attributes (heat, electrical energy, chemical energy, etc.). Similarly, the attributes of information are experienced in various forms (knowledge, news, etc.). (p. 90)

Saracevic, 1970:

At the base of information science is a concern about man's communication processes. . . .

A communication process can be thought of as a sequence of events resulting in the transmission of something called information from one object (usually referred to as the source) to another (the desintation). We may not know what information

is, but we can study its various manifestations, properties and effects. . . . (p. xix) Thus, information may be viewed as a complex phenomenon with a variety of physical, biological, and behavioral properties. . . . [The] special interest of information science is to study a variety of properties of information and communication processes not in isolation, but in that dynamic and mutual interaction which shows their interrelation and interdependence. In other words, the basic subject matter of information science is study of the behavior, properties and effects of information in all of its facets and study of a variety of communication processes affecting and being affected by human beings.

Communication processes are carried out by means of systems, referred to here by the generic name, information systems. . . . Thus it is also of interest in information science to study the structure, objectives, functions, properties, behavior, and performance of information systems.

. . . .

[Information] science is viewed here as basically a science- and research-related discipline rather than a practice- or technology-related discipline. (p. xx)

. . . .

Communication studies significant to information science are those which deal with communication of human knowledge, because this is (as far as human activities are concerned) the most important communication there is. In the realm of information science, the study of the communication of knowledge has been conducted from two different approaches: one is the study of the behavior of literature, using mostly statistical and mathematical approaches, and the other is the study of the behavior of users of information, using mostly psychological approaches. (p. xxi)

. . . .

It is believed that all information systems share the following five basic functions (loosely defined):

(a) Acquisition	getting the material ("information," "data," "knowledge," "books," "commands," "signals," etc.) which at a minimum implies some selection process.
(b) Information Representation	conceptual handling of the acquired material in some representative form and structure, which at a minimum implies a language (natural, artificial, indexing, classification, coding, etc.) or some combination of languages.
(c) Organization of Files	storing of materials and/or storing of their representations, which at a minimum implies physical arrangement.
(d) Question Handling and Search Procedures	getting whatever is in the system out in some organized and delineated fashion, which at a minimum implies the ability to search on a restrictive basis; i.e., it implies an output selection process.
(e) Dissemination	distributing of the output, or displaying it in some organized form, which at a minimum implies arrangement of both a conceptual and a physical nature and distribution patterns. (p. xxii)

Saracevic, 1971:

> At the base of information science is a concern about man's communication processes in general, and about the most complex and in value most precious communication there is--the communication of knowledge--in particular. (p. 152)
>
> . . . .
>
> A communication process can be thought of as a sequence of events resulting in the transmission of something called information from one object (usually referred to as the source) to another (the destination). We may now know what information is but we can study its various manifestations, (e.g. knowledge, literature) properties and effects. Thus, information may be viewed as a complex phenomenon with a variety of physical, biological, social and behavioral properties which may be studied in isolation, as properties have been studied in other fields. However, the special interest of information science is to study a variety of properties of information and communication processes . . . in that dynamic and mutual interaction which shows their interrelation and interdependence. In other words, the basic subject matter of information science is the study of the behavior, properties and effects of information in all of its facets and study of a variety of communication processes affecting and being affected by human beings.
>
> . . . .
>
> Communication processes are carried out by means of systems, referred to by the generic name, information systems. . . . Thus it is also of interest in information science to study the structure, objectives, functions, properties, behavior, and performance of information systems. (p. 153)

Yovits and Mathis, 1971:

> [We] consider information science to be a broad discipline concerned with the generalized study of information flow. Information is defined as data of value in decision making and a "generalized information system" of virtually universal applicability is accordingly established. We then define computer and information science to be the study of information processing and information flow in this generalized system. (p. 118)

Debons, 1972:

> Information is a problem because we are unable or have not tried to bridge the gap between the technological aspects of information and the theoretical. The emphasis has been largely technological, and for this reason we talk about information in technological terms. Let me discuss this briefly:
>
> We talk about information in one sense as if it were a noun--a thing we are able to buy, sell, acquire, use, and in another breath we discuss it as a verb--something we do--get information, develop information. Shannon talked about it as a state of the organism-uncertainty. I am inclined to think of information as both a process and a commodity, with the two possibly being represented by different

but interrelated laws. I like to think of information as a process that can be considered to include a number of action steps some of which are cognitive. I would also like to think of information as a commodity which can be understood in terms of laws which characterize economics. I would like to think of information as an environment representing the assembly of peoples, equipment, and procedure--in the latter sense as a system obeying system laws. Consequently, I visualize a science of information as an attempt to bridge these three dimensions by laws which are meta-scientific in character. (pp. 13-14)

Primarily and in the final analysis however, the problem is information because we do not know much about information as a process. The theoretical realm of this aspect of the problem is quite diverse. Some consider information as a construction of concepts, both visual and perceptual; others like to consider information as a matter of storage and retrieval of associated elements occurring perhaps at the central or cortical level or, from another point of view, at the peripheral or sensory level. In all of this, the conclusion is advanced that information is a human process. Any organism can function toward developing information. (p. 14)

Wellisch, 1972:

[Information science] is primarily concerned with words and the way in which they are used to record and communicate knowledge, . . . (p. 158)

. . . .

In central and western Europe, Documentation is still the official designation for the whole field, i.e., the study of recorded knowledge as well as its physical carriers (documents), . . . (p. 160)

. . . .

[Documentation] in the US came to mean only part of what it meant in Europe--the technology or the hardware, but scarcely ever the conceptual content or the software.

This was probably the reason why a new term "Information retrieval" . . . was considered to be necessary and also why it was so eagerly adopted. Although originally meant to signify only the operations necessary to gain access to recorded knowledge irrespective of the form of documentary carriers and aimed at making a distinction between the physical and mental activities that have to be carried out to this effect . . . [information retrieval] became an "in"-word, and . . . the term supplanted "Documentation" almost entirely, and became virtually equivalent to the European idea of "Documentation". Somewhat later, it was realized that, to "retrieve" information from a place, it obviously had to be stored prior to the retrieval, so the term was augmented to "Information storage and retrieval" (ISR). (p. 161)

. . . .

[The] term "Scientific information" was sometimes used glibly and indiscriminately as a synonym for ISR. (p. 162)

. . . .

As far as can be ascertained by a fairly exhaustive search of the published literature, the term "Information Science" (IS) was first used in 1959 as a designation for the study of recorded knowledge and its transfer in the widest sense. (p. 163)

. . . .

[The] British reserve this term [information scientist] for scientists who are engaged in providing scientific information to other scientists. The underlying assumption is that information of a scientific nature can only be collected, interpreted and disseminated in a meaningful way by people who are themselves scientists and knowledgeable in the subject field concerned, and who can serve as professionaly accepted interpreters of information in a scientific environment.

. . . .

The discrepancy of views about what constitutes IS and what, on the other hand, is Science Information has contributed still further to the ambiguities of definition which plague the field. (p. 169)

. . . .

The adoption of the name Informatics for the study of information in all its aspects would be beneficial. . . . (p. 177)

. . . .

[If] the study of information is to become a science in the real sense . . . [it] can only try to discover and formulate the laws, if any, that govern the creation, transmission and reception of meaningful and therefore potentially informative messages. (p. 179)

Monasterio, 1973:

[There] is no hope for a coherent science of information is we decide to treat information as a merely physical function. Indeed a science of information of this type would literally find itself without any object of study, the reason being that the only means we have to determine whether a given system belongs or not in the field of study of the science of information is by reference to our everyday experiences of meaning and of purpose. (pp. 202-203)

Rathswohl, 1973:

This dissertation proposes that informatology's 'main contribution' to information science be reconceptualized around two interrelated tasks that directly derive from the considerations of critical metascience. The first task involves the design of an adequate critical framework for information science; such a framework would apply not only to information science per se but would relate also to science and society as a whole. This critical framework would take the form of a theory of the relationship of information generation and information utilization. The second task of informatology would be to actually employ the critical framework to critique information science activities. (pp. 250-251)

. . . .

[The] critical task of informatology would be to determine the 'progress' of information system design activities in terms of how they contribute or detract from real-world, holistic, democratic inquiry.

. . . .

[Informatology is conceptualized] as a critical metascience with the practical intent of facilitating the information system design process.

. . . .

The proposal is for a critical science of information--informatology--which would itself be inquiry into the legitimacy of the fundamental principles of information. (p. 255)

Rosenberg, 1973:

> I see it [information science] as the quest for understanding of the nature of information and man's interaction with it. (p. 221)

Merta, 1974:

> Many authors have tried to formulate "informatics" also known as "information science(s)", "informatistics", "informology", "informatology", "exagelectics", etc. as a new branch of science. Some authors deny the existence of informatics as a science, but they fail to indicate which of the traditional, recognised sciences should handle the whole complex of "the information problem" within the field of social information and social information systems. Information is always highly associated with the existence of an information system. (p. 257)
>
> . . . .
>
> There are two possible approaches to defining the universe [of] discourse of informatics (inf. science):
> 1. the most general approach which reflects all basic kinds of information, "physical, biological and social information" and studies their origin, transfer processing and, influence within all kinds of physical, biological or social systems with which the given set of information is associated. (p. 260)
>
> In this sense we speak about the "general theory" or "general science of information" also known as "informology" or "informatology". . . . The conjunction of all three circles represents the common laws and information effects valid for all three theories and can be considered as the metascience of information and common basis for information oriented scientific disciplines and technologies. (pp. 260-261)
>
> . . . .
>
> [The following] graph is just an example of the possible structure of disciplines and subdisciplines in the general science of information.
>
> . . . .

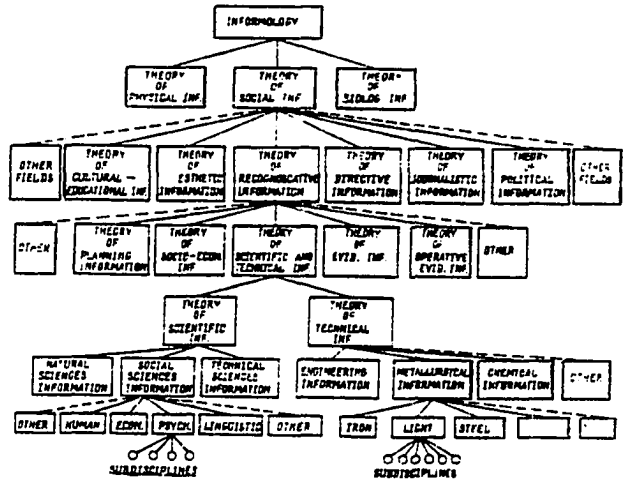


Fig. 2: Structure of informology (p. 263)

Studer, 1975:

> It is proposed that combining a naturalistic and inductive dimension with the familiar and indispensable artifical-systems-oriented work of cybernetics will help to meet the requirement that theoretical constructs in information science (first among which is the construct 'information') be endowed both with generality (or with logical links with very general concepts), and with applicability to the empirical study of discriminable phenomena of human and animal communication--both inter-organismic and intra-organismic (physiological).
> . . . .
> [Included should be] the study of informational phenomena of a physiological nature and if possible those of a chemical and physical nature in the systematization. The link with cybernetics remains to the extent that theoretical cybernetics provides a framework for the conceptualization of communication and control phenomena at a basic level.
> . . . .
> [The] use of cybernetics and general systems theory can be usefully supplemented in this context by an evolutionary framework, extended sufficiently to include in its scope the development of information phenomena from non-living nature to the realm of biological, psychological and social action. (p. 14)

Cook, 1976:

> And what will the development of a mature theory of information science do for the day-to-day practitioners of the art of information handling and manipulation? (p. 1)
> . . . .
> So while what information science is, still remains to be clarified, Artandi [1972] was able to answer very well what it does.
>
> > It seeks to find answers to such questions as: What is information and what is its relationship to knowledge? How is information transferred? What is the value of information and what are some behaviorial patterns that relate to the use of information? How much information can be processed and tolerated by an individual. [p. 17] (p. 11)
>
> I would doubt that a clearer more precise definition of what information science does is to be found in the professional literature. (pp. 11-12)

Shaughnessy, 1976:

> The metascience which seems to . . . link effectively disciplines such as librarianship, systems theory, logic, and computer science, is information science. (p. 171)
> . . . .
> Information science, as used in this context, is defined as the study of fundamental principles underlying the structure and use of information. It has two essential elements: the phenomena of information and man's relation to the phenomena. (footnote 15, p. 175)

Pratt, 1977:

> Information Science is . . . perhaps the ultimate science of the artificial, for it examines not artifacts, but artifact-at-least-once-removed. It studies not agglomerations of objects arranged in particular ways to suit human purposes (machines), but agglomerations of symbols, intrinsically without meaning, arranged into patterns of symbols about artifacts; worse yet, into patterns of symbols about things which have no existence at all. (p. 204)
>
> . . . .
>
> If "In-formation" is the inward forming, or shaping of one's image, Information Science should be concerned with the systematic study of informative events. . . . caused by graphic records. (p. 216)
>
> . . . .
>
> [The] province of Information Science should be (at least) three-fold: 1) the study of the motivations and purposes of individuals who create graphic records, 2) the study of the characteristics of the graphic records themselves, and 3) the study of the motivations and purposes of the individuals who use graphic records for various ends. A short definition of Information Science is:
>
> The study of the creators,
> the users,
> the uses,
> the characteristics and
> the distribution
> of graphic records. (p. 217)
>
> . . . .

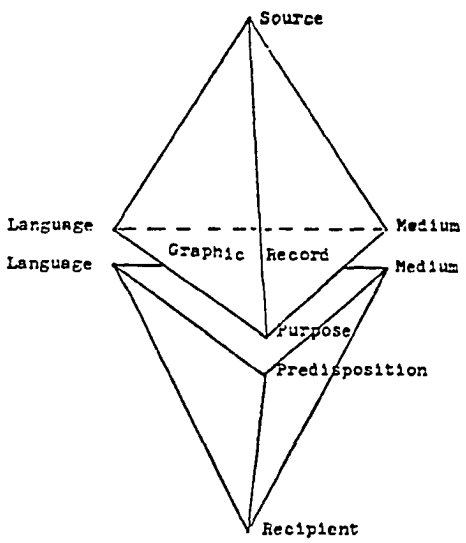


Figure 2 (p. 216)

Brookes, 1978a:

> The field of objective knowledge and the information processes which interact with it is therefore open to scientific study and is, I suggest, the field of study of informatics. All these processes are of course cognitive. (p. 15)
>
> . . . .
>
> Theoreticians in Britain seem to have accepted a first discrimination: knowledge has a structure whereas information need not be structured. Information can then be defined as that which modifies a knowledge structure. The modification may be simply additive; it may lead to structural modification only, or it may be both additive and structural. The 'fundamental equation' expresses this relation compactly:
>
> $$\Delta I = K(S + \Delta S) - K(S)$$
>
> One task of theoretical informatics is to clarify all the symbols of this equation. (p. 13)

Fogl, 1978:

> [We] would like to define and outline the problem field to be studied [in informatics]. Thus, this problem field is that of specialized information, of its structure, properties and functions in the social production process. The content and scope of specialized information has been broadly defined by the characteristics of its separate components, i.e. sci-tech, economic and political information. (p. 36)

APPENDIX III

ADDITIONAL CONJUNCTIONAL DEFINITIONS OF LIBRARY SCIENCE AND INFORMATION SCIENCE

5. Conjunctional Definitions about Objects

5.1. Conjunctional Definitions about Objects: To make accessible

Slamecka and Taube, 1964:

> Since known order is a prerequisite of access, organization may rightly be called a primary foundation of librarianship; . . . The main object of organization in librarianship is "information"--the content of physical materials; . . . For unless it is accepted that information is the proper object of library organization, with the physical item being a corollary of it, librarianship practically abrogates the interpretive function of its service. (p. 67)
>
> . . . .
>
> If our family is information, that is, the intellectual content of physical records, we cannot seek solutions to the organization of information in books separately from solutions for periodicals, and for documents, and for patents, or for microfilm; . . . (p. 70)

5.2. Conjunctional Definitions about Objects: To retrieve

Shera, 1956a:

> [Documentation] has achieved its most spectacular advance in the sciences, and hence unfortunately is often associated exclusively with them, . . .
>
> . . . .
>
> A similar awareness of the need for more effective control over methods of storage and retrieval of information is becoming evident in such social science fields as law, government, and public administration. (p. 104)

Foskett, 1966:

> Although, as Shera continually emphasizes, documentation develops from librarianship, it has some aspects that are qualitatively new, and these have caused some specialists to draw a distinction between the two professions. Part of the purpose of this volume is to argue that there is no such distinction, that however much the branches of the activity may spread and ramify, the parent tree is the same. (p. xi)
>
> . . . .
>
> Documentation in the sense of current awareness and retrospective searching services has been the characteristic activity of special libraries in science and technology. (p. xix)

5.3. Conjunctional Definitions about Objects: To transfer

Slamecka and Taube, 1964:

> At the present time we are witnessing the establishment of a multidisciplinary profession called information technology and of a field of intellectual endeavor called (by some at least) theory of information systems. Their fundamental objective is to use current implements, intellectual and mechanical, to furnish the methods and systems for solving two areas of information service: a rapid and rational dissemination of information, and its long-term storage in a form in which it can be efficiently queried and retrieved. This objective must strike all librarians as differing from the professed services of the library profession only in the method it uses. (p. 65)

Salton, 1975:

> Among the various information processing tasks which may be carried out with computing equipment, a special class exists for which the term information takes on the literal and direct sense of recorded knowledge, or intelligence. The elements being transformed are then no longer restricted to mathematical symbols alone, but they may be words and phrases, books, documents, pictures, and other information carriers. It is that more restricted interpretation of an information process which gives rise to the field of information science, concerned with the collection, analysis, classification, storage, retrieval, transmission, and dissemination of recorded data and intelligence. (p. xi)
>
> . . . .
>
> The current volume is designed to bridge the gap between computer science and information science by introducing a new environment, called the dynamic library, and a set of dynamic information processing tasks to operate in that environment.
>
> . . . .
>
> This volume should then be useful in computer science to cover courses dealing with file manipulations, natural language processing, and information storage and retrieval; in information science and documentation for a curriculum in modern information and file processing; and finally, as an advanced text in library science, treating topics in library mechanization, and the "new" library. (p. xii)

Davis and Rush, 1979:

> Information science is an interdisciplinary field concerned with all phases of the information transfer process. Through library science it can even trace its roots to the period 669-630 B.C. and to the cuneiform inscriptions on clay tablets collected in Nineveh by the Assyrian king Ashurbanipal. However, although information science derives from and is indebted to many fields, it achieved an identity and image of its own during the post-World War

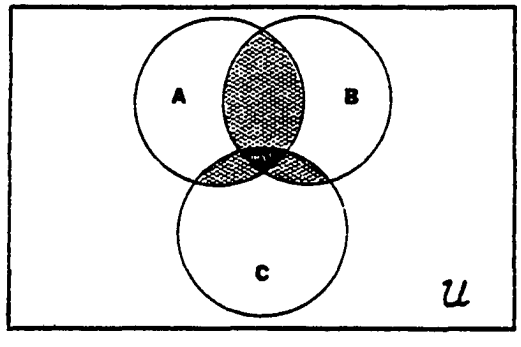
II period, when many scientific and technological advances were put to peacetime use. (p. 3)

. . . .

As an interdisciplinary field, it [information science] can be viewed as a spectrum of activities ranging from information theory through information technology to service-oriented functions, such as library and information center management. In fact, it is possible to visualize it through the use of a Venn diagram, a qualitative and descriptive technique for showing the logical relationships among sets within a universe or population. . . . (p. 4)

If one adopts a "hard" view of information science, one might state that it is defined by the intersection of all three sets in the diagram. A "softer" viewpoint might allow for logical union. Most information scientists would probably agree that some sort of compromise would be appropriate for an emerging field of this type, and therefore the diagram is shaded to suggest the various possibilities. (p. 5)

. . . .



A = [Information Theory (for example, cybernetics, linguistics, formal logic)]
B = [Information Technology (for example, electrical engineering, computer programming)];
C = [Service-Oriented Functions (for example, library and information center management)];
U = Universe of Relevant Fields

Figure 1.1. Venn diagram illustrating the relationships among fields relevant to information science

(p. 4)

Kaske and Rush, 1980:

The purpose of research in library and information science is to find the best methods of acquiring, organizing, storing, accessing, retrieving, and disseminating information (or data). (p. 319)

5.4. Conjunctional Definitions about Objects: To process

Rees and Riccio, 1967a:

What are the implications for librarianship of the progress made in information processing? . . . . [Most] of the research and development in information processing has taken place outside the library schools and represents the efforts of non-librarians. (p. 108)

Davis, 1968:

> Information science, like documentation, is interdisciplinary, and it would seem to concern itself primarily with the procedures of methodology of information processing. Figure 1 shows a chart depicting a spectrum of activities which range from information theory through information technology to service-oriented functions. Examples of specific activities or subject disciplines are listed under each of the three major categories. Because of its interdisciplinary nature, information science is designated by a line covering a wide range of the activities on the chart.
> . . . .

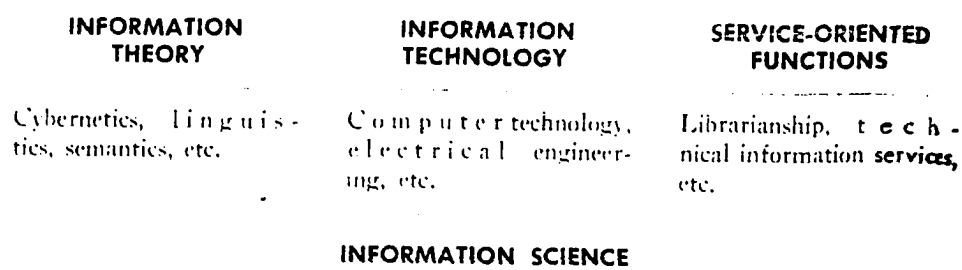


Fig. 1. Chart illustrating the interdisciplinary nature of information science.

(p. 6)

Stoica, 1972:

> The real cause of the false contention between librarians and documentalists is the attitude towards documents. Nevertheless, the contention lacks any real support, because in everyday practice the respective activities often overlap each other, having the same significance and target. For conventional librarianship, rigidly traditional, the document means everything; . . .
> . . . .
>
> Unlike the librarian, the documentalist considers the document a composite, clumsy, mixed unit, almost of no interest to him. His measure unit is information. He tries to remake his own way to the core of matter, a path followed by science itself, preserving the hope to operate with the pieces of information, to study them and to make them interact as if they were elemental particles.
> . . . .
>
> Even so schematically and superficially opposed, both attitudes towards the document are erroneous to various degrees. Obviously, it is information which finally interests us and not its bearer. But for the contemporary world, the document is the reference unit. We cannot organize information soundly and usefully without organizing the documents first of all. Information needs the documentary basis, and through this the whole flux of activities which starts with the selection, the processing, the preservation, and the circulation of the documents. (p. 308)

Sergean, 1977:

> The terms of reference of this project required the research team to consider libraries and information units of every main type, ... (p. 2)
>
> . . . .
>
> One problem for the outsider who is required to work in this field is its lack of definition, ie the absence of precise and generally-agreed boundaries. Which staff are covered? What kind of information is the legitimate concern of the information specialist? What activities may be included under the heading of librarianship and information work?
>
> . . . .
>
> This difficulty in defining the library and information field appears to stem directly from the nature of the commodity handled, namely information. This commodity differs from most others in that it is not, and never can be, the exclusive province of one occupational group, but is the concern of many. (p. 7)

Fosdick, 1978:

> When, however, one restricts the scope of these studies [of information science programs] to exclusive concern with the programs of education in information science as offered by graduate schools of library science, the number of comprehensive studies available is drastically reduced. (p. 100)
>
> . . . .
>
> "Non-traditional" offerings in the library science curriculum were considered as information science courses--in other words, courses that would not have been offered in library schools prior to the interest in and awareness of information science as a field in its own right in the 1960s. Implicit in this definition is that such courses relate to the relatively new practice of the manipulation of data by computer. (p. 101)

5.5. Conjunctional Definitions about Objects: To create and use

Nil additional.

5.6. Conjunctional Definitions about Objects: To use

American Library Association, 1970:

> Library service as here understood is concerned with knowledge and information in their several forms--their identification, selection, acquisition, preservation, organization, communication and interpretation, and with assistance in their use. (p. 1)

Mason, 1970:

> [In] the main we are involved in those information systems which relate to recorded knowledge in all types of media, and with methods of exploiting that knowledge, and it is my intention to attempt to demonstrate the position of information science as the core of all our activities, and to show the interconnection of theory, research and practice.

5.7. Conjunctional Definitions about Objects: To analyze

Nil additional.

5.8. Conjunctional Definitions about Objects: To evaluate

Nil additional.

5.9. Conjunctional Definitions about Objects: To manage

Meetham, 1970:

> From this custodianship of the highly important primary texts, both loose and in bound form, a new aspect of librarianship has emerged.
>
> Documentation is a word that has recently enlarged its meaning from the particular to the general, and from a set of objects to a training. Formerly it meant a special set of documents--the documentation of an event was a collection of documents describing that event and others closely connected with it, to which any historian preparing an account of the event must continuously refer. This meaning has now been largely superseded, and documentation is one of the arts of a librarian, mainly in science libraries. It is the management, in a very broad sense, of the reports and periodicals in the library, including those that are out on loan or in circulation. These documents, rather than books, usually comprise the bulk of scientific collections. . . . (p. 117)

6. Conjunctional Definitions about People

Nil additional.

7. Conjunctional Definitions about Objects and People

7.1. Conjunctional Definitions about Objects and People: To make accessible

Clapp, 1950:

> Bibliographic organization may be defined as the pattern of effective arrangements which results from the systematic listing of the records of human communication. Such listings are themselves called bibliographies, and the art of making them is bibliography. (p. 4)
>
> . . . .
>
> In passing, it may be pointed out that the concept of "bibliographic organization" is not very far separated in content, though somewhat in point of view, from what has been called "bibliographic control." The first term is descriptive of the condition, while the second refers rather to the effect of bibliographic work. "Bibliographic control" has been defined as "the mastery over written and published records which is provided by and for the purposes of Bibliography," and as being synonymous with the phrase "effective access through bibliographies." (p. 5)
>
> . . . .
>
> By providing information regarding these prior records [of communication] bibliography makes them useful and the information contained in them available. The importance of the role of bibliography, then, is a function of the importance of the information or ideas contained in these prior records, qualified by an expression of the ability of the users of these records to gain access to the information or ideas without the use of bibliography. (pp. 3-4)

Egan, 1950:

> Yet the rationalization of subject bibliography is not in itself a complete answer to the problem, for a mere bibliographic listing will not satisfy the inquirer if he is unable to proceed from the citation to the original. There was, therefore, purpose in the choice of the term "bibliographic organization" rather than "subject bibliography" or even "documentation" as the topic for discussion at this Conference. (p. 253)
>
> . . . .
>
> If bibliographic services are to be effective, the arrangements resulting from them must include the machinery to provide <u>physical</u> as well as <u>content</u> accessibility. (p. 256)

Mohrhardt, 1956:

> Although the classical concept of libraries and librarianship did not continue unabated, and although there were centuries when the preservation of books was the justifiable preoccupation of librarianship, there were always librarians who collected documentary information of all types and who tried to make it

readily available to users. (p. 413)

. . . .

Documentation has been presented as a 20th century development whose history derives from bibliographic efforts in the latter part of the last century. (p. 414)

. . . .

Librarians who have analyzed the efforts of documentation point out that a distinction between documentalists and librarians may be helpful in areas outside the United States. The term librarian has been used in some European countries to identify a keeper of books who limits his interests to collection, study and preservation of library productions. In these countries it may be necessary to use the term documentalist to define the activities of a librarian who provides the services that have long been regarded in the United States as special librarianship. (p. 415)

Booth and Wadsworth, 1960:

Our basic assumptions are that human society needs access to its recorded knowledge, and libraries have been developed by society as agencies for this access. (p. 220)

. . . .

Documentation is regarded primarily as a scientific attitude toward the materials, processes, and services of research librarianship. . . . All types of research librarians having the desire to help the truth seeker to find answers to his questions have the opportunity to participate in the pursuit of common problems with the scientific attitude which documentation has adopted. (p. 241)

Kent and Lancour, 1963:

The term "knowledge availability systems" was chosen to characterize this field to represent an activity which is broader than "information retrieval systems" or "information sciences" in order to indicate concern with nothing less than the total problem of assuring availability of knowledge for whatever social purposes may be important--whether currently or in the future.

. . . .

We would propose a label that we will tentatively call "communication science," or if we may become quite radical, "library science," which would be somewhat more palatable at our present stage of thinking. (p. 111)

Wasserman and Bundy, 1966:

While librarianship may once have been a field left principally to custodians . . . this is no longer true during the late 1960's. This is a time of considerable flux and upheaval in the field of information service. (p. 1)

. . . .

Because information practice and information technology is a rapdily shifting evolutionary form and because its ultimate shapes and patterns are now only dimly seen, the field's

> manpower problems are accentuated. In contrast with professions which are undergoing a somewhat more gradual metamorphosis, and which are not compelled to compete for the survival of their traditional roles, there is less stability for those engaged in the library and information arts. . . . (p. 3)
> . . . .
> Rapid access to wider ranges of resources in every setting where information and publications are used--schools, colleges and universities, public libraries, information centers, and research institutions--will be expected. (p. 5)
> . . . .
> The Information profession, representing a merger of librarianship with newer information fields, . . . will develope a common ethic and identity. (p. 6)

White, 1970:

> I would be very sorry to see the split [between information science and librarianship] perpetuated, because to me selection, acquisition, bibliographic control, content analysis, dissemination, retrieval, and the research into these individually and as part of the total are only dependent parts of the whole.
> . . . .
> It seems clear that much of the emphasis will be on rapid and simplified access and on information dissemination in forms other than the printed book, . . . (p. 553)
> . . . .
> I believe that the professional aspects of librarianship concerning acqusition, selection, and bibliographic identification, . . . will nevertheless become secondary and adjunct to questions of information manipulation, dissemination, and retrieval. (pp. 553-554)

Maron, 1971:

> Theoretical librarianship is the study of the problem of access--access to data and access to documents. We now seem to be at an impasse in our work on the theory of access systems (i.e., question-answering systems and literature searching systems). If we are to move ahead in our theorizing about information retrieval systems, then we must enlarge our conception of what the problem of information access is about. This involves an analysis of information and its properties by reference to its relation with knowing systems. This paper argues that information science is the study of knowing systems and that theoretical librarianship must move in the direction of information science if it is to progress. (Abstract, p. 42)
> . . . .
> In my view the key theoretical problem of librarianship is the problem of access to stored information. And, one of the central problems of information science is that of information search and retrieval. If these problems concerning identification and access to information are central to both disciplines, in what sense, if any, are they separate disciplines? I see theoretical librarianship as a part of information science whose subject is

the process for knowing. (p. 43)

. . . .

The problem of access is the problem of how to analyze and identify stored information and requests for information, in order to retrieve all and only that which is wanted. (p. 44)

. . . .

The heart of the so-called library problem is the problem of intellectual access to stored information. An understanding of the problem of access, in turn, leads to questions concerning information processing in the nervous system, and to questions of optimal organization of an intelligent artifact. This leads to neuro-physiology, psychology, and epistemology, as well as logic, computing, and the theory of artificial intelligence. There is a single name that has been given to this range of topics that clusters around the question of information and theories of information processing. . . . The name is "cybernetics," but perhaps "information science" is a better title. (p. 46)

. . . .

[Information science] is concerned with explicating the full meaning of information, describing the properties of information, and establishing ways of measuring those properties. And information science is concerned with the formulation of theories on how to analyze, organize, relate, store, process, search for, and retrieve information. Information science is concerned fundamentally with the kinds and ways of information processing that correlate with the process of comprehending; i.e., information science, at its very core, is the scientific study of mechanisms for understanding. (pp. 46-47)

. . . .

[Information] can only be understood in terms of how it affects knowing systems [minds]. Thus information science is the scientific study of knowing systems (natural or artificial); i.e., it is the study of the information processing that must underline such activities as knowing, understanding, comprehending, believing, thinking, solving, etc.

. . . .

My interpretation of information science makes it a subject whose subject matter is the activity of knowing, and how knowing can be explained in terms of underlying information processing. (p. 47)

Mitchell, 1971:

There seems to be emerging a distinction between practice and research in information science. Research has become concerned with experimentation, testing and evaluation of communication process, hypothesis formation, problem solving and decision making. Relevance is studied and measured with regard to its impact on the research productivity of scientists and engineers. It is yet to provide data on the impact of information services. These insights should provide criteria, measures, and concepts for evaluation of the literature, and for the centers and libraries providing the literature as well.

The whole broad field of information science, including library science and systems, is related to and investigates the properties and behavior of information, the means of processing information for optimum accessibility and usage, and the principles governing the flow forces of information. (p. 61)

Penland, 1971:

> Information science studies the transformation of human knowledge in order to provide indexed spaces so that patrons may locate information "surprises" relevant to the nature of their inquiries. Transformations may be isomorphic but retrieval is based largely upon descriptor sets that are presumed to be homomorphic transformations of the knowledge sought. (p. 447)
> . . . .
> [The] main preoccupation [of library and information science] is with the transfer or delivery of materials to points where demand is greatest, and with the systems planning necessary to achieve maximum delivery service. (p. 448)
> . . . .
> Almost from the beginning of librarianship, access to the accumulation of recorded messages has been available through bibliographic control. Library science has laid the foundation for effective control of and access to knowledge. (p. 451)

Shank, 1971:

> [One] cannot fail to recognize in Toffler's analysis the potential of information science and technology to serve society in dealing with shock conditions. (p. 174)
> . . . .
> Information scientists should be highly motivated by Toffler's view of the future. The extension of educational experiences away from the campus, the inclusion of a wider variety of non-traditional environments as classrooms (e.g. the settlement house, the government bureau, the factory) and the expansion of the use of museums, commercial theaters, art galleries, parks, libraries and other such educational agencies, greatly increase the importance of properly designed and efficiently used information systems, and communcations facilities, and ubiquitous access to information and data. We are faced with the prospect of having to provide the manpower capable of integrating dispersed information resources into a utility accessible by many, or demand, with sufficient interactive capability to facilitate reinforcement. (p. 176)

Shera, 1972a:

> The new technology . . . [and] the finely spun theories of information science are but means to an end. They can do no more than increase the accessibility to recorded knowledge that man needs to build for himself a more fruitful life in a better world. The new librarianship, centered as it seems to be about a better understanding of the structure, behavior, and utilization of graphic communication, should provide the ladder that will enable the librarian to climb to new levels of social utility and responsibility and achievement in helping man to understand what he has done and what he can do. To acquire, organize, and service the record of the social transcript, that is what librarianship is all about, that is the apotheosis of the profession. (p. 790)

Belzer and Brown, 1973:

> Acknowledged as a base condition of "civilized" existence in the world today is the view that the human situation has become one in which no single factor is more important to progress in any sector of society than is the availability of reliable information (kept readily accessible, resonibly [sic] organized, and accurately represented or interpreted) in terms of which judgements of worth can be made and reasoned decisions for action may be carried out.
>
> Providing information has always been a prime library function. But today one must ask: Do library services and those provided by newer information centers actually meet societal requirements; . . . . (p. 1)
>
> . . . .
>
> Taking advantage of a semmingly ever-broadening range of modern electro-mechanical devices development for information transfer and handling, local "information centers" would maintain direct access to regional, national and even to international centers. Local units would, however, be able to tap directly world-wide networking approaches to the gathering, sorting and storing of knowledge and, in light of constituent requests, be able to initiate independent searches, handle information retrieval and effect distribution. . . . (p. 15)
>
> . . . .
>
> [Prime] concern [in library and information service education] is with information needs and with provision of access to information as such and <u>not</u> simply with the location and delivery of library materials. (p. 20)

Dervin, 1973:

> [The] nature of the linkages (or interactions between the components) and the corresponding barriers to information accessibility must be known, for it is along these linkages that the effectiveness of the information system rests.
>
> Figure 2 points only to the potential locus of the barriers which may exist in the system. The model says nothing about the underlying mechanisms which may be acting as barriers to information accessibility. For this reason, it should be helpful at this point to posit a set of accessibility factors which are conceivably operating in the system. (p. 15)
>
> Using the individual as the focus, it is suggested that he must have accessibility to information along five different lines.
>
> a. <u>Societal accessibility</u>. . . .
> b. <u>Institutional accessibility</u>. . . .
> c. <u>Physical accessibility</u>. . . .
> d. <u>Psychological accessibility</u>. . . .
> e. <u>Intellectual accessibility</u>. . . . (pp. 15-16)
>
> . . . .

. . . .

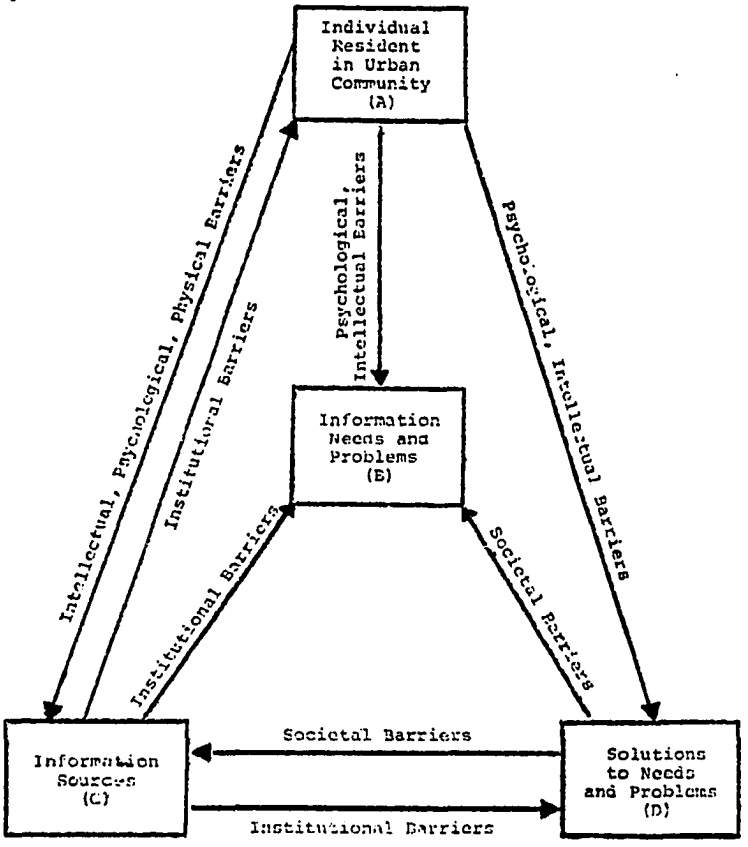


Figure 3-3. Expanded Model Incorporating Accessibility Factors (p. 19)

Shera, 1973:

> [The library] has not changed its basic mission, which is to maximize the social utility of graphic records, and it is its special responsibility to operate in that complex association of record and human mind. (p. 94)
>
> . . . .
>
> We are concerned here, first with the process of communication itself, and second, with the problem of knowledge.
>
> . . . .
>
> Though the library serves mainly the individual, the ultimate objective is the betterment of society; therefore, the librarian must know not only the cognitive system of the individual, but also the communication network of society. . . . Yet the study of the nature of knowledge, and the relationship between that structure as it has developed in contemporary Western civilization and the librarian's tools and resources for intellectual access to it, have received scant attention and no serious explanation. (p. 95)

Foskett, 1974:

> Information scientists are by definition sources of information . . . organised in stores to meet the needs of particular groups of users who direct at least some of their activities towards a common purpose. All stores of information, of whatever character, serve users, but the distinguishing feature of those served by the information scientist is that their membership of the group is determined by their wish to bring about some desired and known achievement. . . . [Their] basic function is to organise all sources of information that contribute to the success of the enterprise. They organise these stores for ease of access, for themselves acting on behalf of others. They do not generally, in practice, pass on the responsibility for using the store to another group, but carry it out themselves; the characteristic activity of an information scientist is to handle specialist literature himself, giving a current awareness service from newly-published material, and searching his store retrospectively for the answers to requests for further information on subjects of interest to his users.
>
> Thus, information scientists have to acquire documentation of every kind that may be relevant to the needs of their organisations, present and future, for intelligent anticipation of future needs adds a very special value to an information service. They are interested in the publication and distribution of specialist information, . . . (p. 12)

Hayes, 1974:

> Once one has made the obvious comments about the functions of the librarian in communication with mechanized data bases--in acquisition of them, cataloging of them, formulation of profiles for search of them--there would seem to be little more to say about the role of the librarian.
>
> There is one thing more, however. And it concerns the role of the librarian, not the changing one, but the historically significant one: the problem of <u>document</u> access, the problem of providing the books or journal articles that all of the information retrieval services may lead us to. Yet this historically significant role would appear to be as important today, with the tools for information access that the computer provides us, as it has been in the past. It may well be that the role of the librarian is not changing as much as we may think it is.
>
> . . . .
>
> [We see] new terms for functions of the librarian (information science).
>
> . . . .
>
> But recognize the fact that if the record is not preserved and if access to it is not available, it is impossible to provide access to the content. (p. 118)
>
> . . . .
>
> The Second World War resulted in three things, each of which alone would have produced a crisis for libraries. Together they created "information science" as a new role for librarians. . . .
>
> . . . .

> The answer lay in the development of systems--"information systems"--that would do three things:
> (1) Make it easier and more economic to produce means of secondary access to literature of all forms.
> (2) Make it easier and more economic to use them as the means of access to content.
> (3) Provide means of analysis and presentation of the content, so as to reduce its bulk and increase its long term value.
> The result was indeed the creation of a role for librarians as specialists in designing such systems and in carrying out the functions involved in their operation--information scientists and information specialists--roles made necessary by the attempts to apply computer technology to library and information handling contexts.
> . . . .
> [The] relationship between libraries and information handling technology--this "new role for librarians"--has been a long and continuing one.
> . . . .
> Thus, the important point about the "new role of the librarian" is that it is not new. All of the threads that today we bring together in "information science"--and I think that is the proper context in which to view that role--were there 125 years ago. (p. 119)

Larson, 1975:

> By this paper's definition, any person who acquires, catalogues, preserves, and makes available information for a defined constituency belongs to the information managers' profession. This profession is composed of five separate, distinct subprofessions: librarians, archivists, records managers, audiovisual specialists, and information scientists. (p. 5)

Becker, 1976:

> In this [U.S.] Bicentennial year, the information science profession is challenged to help establish a nationwide library and information network in the U.S. which will eventually provide every citizen, regardless of geographic location, equal opportunity of access to that part of the nation's total information resource which is of interest to him. . . . Our future capability to handle information efficiently in America will, to a large degree, depend on how well information scientists are able to harness the power of computers and communications to do the job. (p. 13)

Klempner, 1976:

> [Proposed] is an intellectualization, expansion and deepening of library school goals, objectives and curricula to encompass all facets of document organization and information service activities applicable for the organization and servicing of recorded information in traditional as well as nontraditional information service

environments. (p. 2)

. . . .

[An] intellectualized, generalized and expanded curriculum would, of necessity, lead to a more pervasive and in-depth study and analysis of the principles of librarianship--principles applicable for the management of recorded information in traditional as well as nontraditional information service environments. It would also follow that such an orientation would, in effect, focus on information organization and service principles governing not so much the profession, as the discipline of librarianship. . . . Freed from the overwhelming preoccupation with print-oriented clientele, existing job descriptions for library personnel, existing bureaucratic structures for their processing and utilization, the new library school curriculum would, at long last, seek to study and analyze objectively the fundamental components and links within the total information transfer chain, i.e., from the producer of information to the consumer of information. It is only within such a framework that specific library applications would take on meaning and significance. (p. 4)

. . . .

Perhaps the proper time has arrived for a majority of our library schools to begin the essential changes and revisions of their curricula--curricula based upon the concept of a total national information resource to be made accessible to all segments of society. Curricula based not on existing and potential job markets for librarians, but based on existing and potential job markets for information service professionls. (p. 5)

Soergel, 1976:

> [The] information professional (whether the manager of an information system or a reference librarian/information specialist) must be thoroughly familiar with: 1) the task of the users of this system; 2) the information needed and the information available to contribute to this task; and 3) the information storage and retrieval techniques that can be used to make this information accessible. (p. 258)

Buckland, 1977:

> There is a third area that can be called information science in that it involves the scholarly study of information; . . . This concerns access to recorded information--the transmission of knowledge through records. I include in this the whole area of indexing and all that has been hypothesized about processes of information storage and retrieval, the meaning of indexing, and the interfaces between users and indexes and records. . . .
>
> We must include the explication of human behavior associated with all these activities. The field is clearly as much a part of the social sciences as anything else. . . .
>
> I find it convenient to refer to this field as "library-and-information-science" (all one word). The advantage of the

phrase "library-and-information-science" is that it helps us get away from the stultifying polarization of librarianship versus information science.

. . . .

Now if we adopt the "library-and-information-science" definition of our subset of "all-embracing" information science, and if we regard the information science component as primarily theoretical activity, then more needs to be said. . . . [Information science] must do more than be a theoretical activity. It must relate in some way to activity involving access to information. Library provision is an almost ideal area of activity for such study, but not the only one. (p. 16)

. . . .

What we need [is] . . . most of all, an integrating drive to redress the damage done by the tendency to separate information science from librarianship. (p. 17)

Kirwin, 1977:

Indeed, the term information science is so broad as to encompass most of the traditional social sciences and liberal arts, in addition to computer science, library science, and cybernetics.

Information science as a practice often tends to be library science. This is a natural consequence of interest in the problems of access to scientific and technical information.

. . . .

[Mass-communication and business-information systems] are given relatively little attention in the information science literature. Yet whether we call ourselves library scientists, computer scientists, or communication scientists, we are all information scientists concerned with the communication of information. Our interests differ only in details such as transmission medium, message content, types of sources and receivers, and persuasive intent. (p. 24)

Wellisch, 1977:

The term 'bibliographic control' seems to have been introduced into the literature of librarianship in the year 1949 . . . [by] Egan and Shera. . . . The authors did not formally define this concept but delineated its operational goals, namely to provide content accessibility and physical accessibility. They also pointed out that the notion of control is intimately connected with the effective use of machines towards a desired goal. (p. 82)

. . . .

The new term, 'bibliographic control', was soon widely adopted by librarians and documentalists, even though Shera and Egan initially sought to replace it by 'bibiliographic organization', fearing that the word 'control' might evoke some unwanted associations with censorship. These apprehensions proved to be unfounded, and the new term was eagerly adopted by the library profession. . . . As is so often the case with newly

> coined and fashionable terms, bibliographic control (BC) was however soon interpreted to mean many different things, and has been used indiscriminately to denote almost anything from the composition of a list of references to just about any activity connected with the storage and retrieval of recorded information. (pp. 82-83)

White, 1977:

> [I] am really unhappy, as other people are unhappy, by the nomenclature clashes of libraries versus information science.
>
> . . . .
>
> It seems to me that if we are talking about a field which has a theoretical basis, a research and development function, is concerned with the provision of information services, is concerned with evaluations of what these services are, management, which involves the determination as to where we can best utilize the computer, whether we should use alternate forms of storage or communication, bibliometrics, user studies, alternate formats--all of this is the normal and logical process of managing <u>any</u> type of information service.
>
> . . . .
>
> Some things have been said today which have assumed that a perceived function is the provision of access to information. I certainly accept this; I certainly believe this, but I am not sure whether it is universally perceived or accepted, because if we did feel this strongly about it we would be far more concerned about how users utilize the tools for access to information that we, in fact, provide for them.
>
> . . . .
>
> I would suspect that at least to some extent, the fundamental objective of the library, particularly the academic library, is not at all to provide access to information, but rather to provide an ordering and processing mechanism (the old "marking and parking" concept) for what other people in the subject fields have already selected for us. Certainly, in my experience in academic affairs, scholars don't particularly accept our role in providing access to <u>information</u>, only access and very rudimentary access to the physical documents that they have already told us they want us to acquire. It is one of the given premises of scholarship that a scholar ought to be able to keep track of his own field and, in fact, does not need the help of anyone else to be able to find the literature in his own field. In my judgment, this is fundamentally an untrue belief--but scholars cling to it with tenacity. (p. 50)
>
> . . . .
>
> What we need to do, then, is to broaden our own view of what our field comprises. I prefer that to fragmentation within our own field; I prefer that to having functions and areas taken away from us by others. (p. 51)

Williams and Pearce, 1978:

> The library profession bears a unique relationship to the human communication system. No treatment of this system offered to librarians and information scientists would be complete without a discussion of their profession. Our theoretical model of the human communication system provides the foundation for a theory of librarianship and the library profession.
>
> . . . .
>
> The library is to the literate society what the memorizer is to the preliterate society. The preservation of social and cultural forms, of knowledge and human experience, depend on the preservation of literature. The library performs the critical function of preservation, which is the keystone of civilization.
>
> . . . .
>
> In addition to preserving literature, the library profession undertakes the enormous task of organizing and controlling the vast literary resources committed to its care to make them accessible. The organziing and retrieval systems that the library profession has created enable the preserved literature to be used. Organization and control are essential if the sheer bulk of the material preserved is not to result in loss due to inaccessibility. Without the retrieval technology it has created, the library profession would be like the memorizer who knows every syllable of the sacred text but cannot speak. (p. 95)

King, 1979:

> Every day millions of persons prepare, process, reproduce, distribute, and provide access to these [information] products and services. The charts show . . . some functions and occupations of those who work as information professionals. . . . (p. 25)

Sellen, 1980:

> One of the results of the traditional approach has been that people using the skills of librarianship but practicing outside of libraries call themselves by some other name, while librarians working in libraries do not think about the usefulness of their skills in other situations. This is further clouded by the use of new labels--information studies, information scientist, information professional--for those who are in fact practicing librarianship. The work that librarians actually do such as organizing, creating, and providing access to information and knowledge that they have about resources, communication, and research is applicable to many working situations. (p. x)
>
> . . . .
>
> There is no longer any question that librarianship has defined itself too narrowly--unless of course one wishes to "give away" those librarian-trained information professionals to some other information profession. . . . It seems desirable for libraries and their various constituencies to concentrate on developing highly skilled and flexible professionals, able to cross over nontraditional settings when needs and personal preference demands. The possibility for this happening depends very much on our responses to a new vision of the professional librarian which encourages and includes information experts--wherever they work. (p. xxii)

7.2. Conjunctional Definitions about Objects and People: To retrieve

Fairthorne, 1965:

> The information sciences study certain aspects of the use of language for certain ends. They do not themselves use language for these ends; they only mention such use. (p. 9)
>
> . . . .
>
> [From] the nature of their duties, documentation, information sciences, and cognate activities concern themselves only with mentioning, not with using. "Mention" is essentially both social and physical. It is without meaning considered solely as a physical phenomenon, which may be defined here as anything that can be treated without contradiction (though naturally without proof) as going on when there is no one around to observe it. Also it is without meaning if we omit the physical, because one cannot mention anything without performing some physical activities.
>
> Some years ago I said that records are mentioned not only by marking, but also by parking; e.g. by putting copies onto labeled shelves or upon the desks of those who may need to read them or have asked for them.
>
> Information science concerns itself, as raw material, with the activities of mentioning who recorded, for whom, in what form, where, when, and what did he mention. Also of mentioning this even more vigorously by supplying a copy; to wit, mention by exemplification: "This here!"
>
> In short, documentary activities mention documents as such. They are not concerned with the use of what a document mentions; only with what it is called by those who use it, and who these may be. Thus, for instance, a technical library cannot devote itself to science and engineering, but to scientists and engineers. . . .
>
> Thus the elementary interest of the information sciences is not "information," but "notification." Before one can inform, one must notify. This condition is necessary but not sufficient.
>
> Before one can notify, one must signal, write, print, type, draw, or otherwise record. Again, this condition is necessary but not sufficient.
>
> . . . .
>
> The lowest level of communication activities that properly includes all six fundamental ingredients--message, code, channel, source, desination, designation--is reasonably called "Notification"; and its theory, when it comes into being, "Notification Theory."
>
> Not only on the level of notification, but on all higher levels, we can engage in and study only such activities as can be delegated. The information sciences can deal only with social, not individual, behavior--that is, with matters that will produce substantially the same linguistic response from any person of a specified type. Matters that do not cannot be delegated. (p. 12)

Borko, 1967:

> An information system is an organized procedure for collecting, processing, storing, and retrieving documentary information to satisfy a variety of needs. The information system consists of a collection of recorded information, custodians who organize and maintain the collection, a retrieval procedure, and the users who refer to the information to satisfy a variety of needs. As this definition implies, there is a great deal of similarity between a library and an information system. Indeed, there must be, for a library is a specific type of information system with a collection of documents, a characteristic method of organizing and maintaining the collection, and a designated set of users. In contrast, an information system refers to a more generalized complex of functions. (p. 123)
>
> . . . .
>
> [System parts of] analysis, file storage, index, and retreival procedures . . . together with user requirements, constitute the main portions of the information system. (p. 125)
>
> . . . .

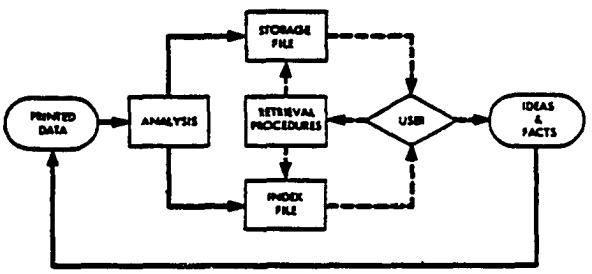


Figure 1. An information storage and retrieval system.

(p. 124)

Corrigan, 1968:

> If one wanted a two word definition, perhaps storage and retrieval best covers the core of library science. Forget, for the moment, means, and concentrate on the basic similarity underlying every happy joining of an individual and necessary information, wherever this takes place. (p. 3)

Fairthorne, 1968:

> Therefore we will consider a theory of "Information Retrieval." Not all library or documentation services are covered by Information Retrieval, but all include it, in the sense that unless we can conduct Information Retrieval, we cannot do anything else. It is necessary even if not sufficient. (p. 364)
>
> . . . .
>
> "Information Retreival" or, better, "Message Delivery" (Lea M. Bohnert's term), is an essential step in all documentary or library services. One cannot retrieve, deliver, or otherwise manage recorded messages without: (1) authors and readers of messages; (2) methods for recording messages. However, Information Retrieval presupposes

these. . . . That is, it does not use the records, it mentions them to those who may use them. Recorded Discourse is itself a tool. So Information Retrieval is the tool of a tool. (pp. 364-365)

. . . .

Much of the confusion about what is otherwise obvious arises from confusing what is spoken about with how it is spoken about. Consider these three sentences, all in acceptable and grammatical English:

"A gives B information."

"A informs B about C."

"A tells B about C."

The first implies some self-subsistent substance called "information" that can be transferred. As a metaphor, it will pass. As an image of reality, it is disastrous.

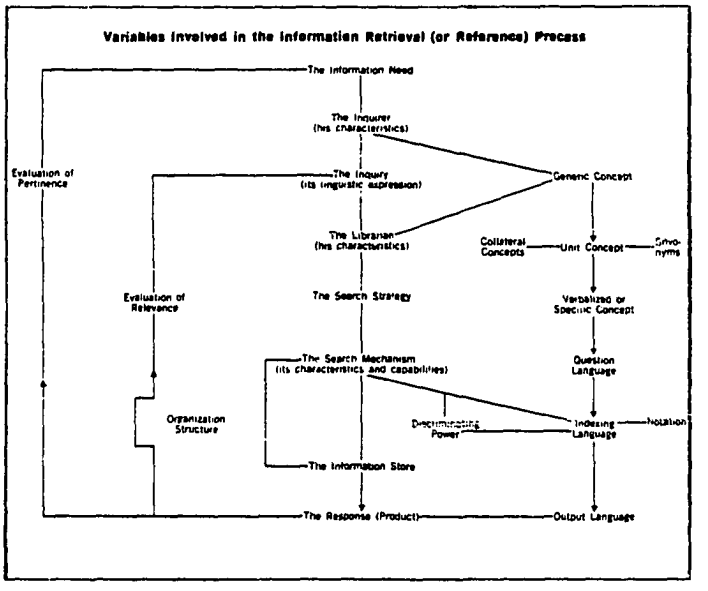
The second implies that B's knowledge about C is changed by what A has said or written. . . . (p. 368)

The third is the only level on which librarians can work. They can make it easier for B to find out what A, and others, have to tell about C. This is a big enough aim to keep librarians busy indefinitely without taking over other people's professions. (pp. 368-369)

Shera, 1972a:

The accompanying diagram . . . illustrates graphically the variables involved in the information retrieval, or reference, process. (p. 787)

. . . .



(p. 787)

Hershfield, 1973:

> Personnel identified with . . . [librarianship] tend to have a humanities background while Information Scientists frequently have a strong mathematics and science background. . . . Libraries and computer-based infcrmation systems are separate categories in a single class called "information storage and retrieval systems." While systems falling in either category do differ from one another in many ways, there are some broad areas in which they are similar, if not identical. The differences between library scientists and information scientists, described above, often have led to systems in each category being treated as though they formed two different and distinct classes of phenomena. (footnote, p. 17)

Lancaster, 1973:

> Perhaps one of the best definitions of information science appeared in 1962 in the Proceedings of the Conference on Training Science Information Specialists. . . .
>
> > The science that investigates the properties and behavior of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. The processes include the origination, dissemination, collection, organization, storage, retrieval, interpretation and use of information. . . .
>
> (p. 122)
>
> . . . .
>
> If we accept these definitions, we could look upon library science as a branch of information science and upon a librarian as one species of information scientist.
>
> However, it may be more accurate to regard librarianship and information science as two areas that impinge one on another. . . . In fact, if we represented these various areas by overlapping circles we would probably recognize a considerable overlap between librarianship and information science, whereas the overlap between librarianship and other fields would be quite slight.
>
> A library is one type of information storage and retrieval system. There are others, including airline reservation systems, command and control systems, management information systems, crime detection systems, and systems for medical diagnosis. The librarian is primarily concerned with one particularly important medium of information transfer, the printed document; and librarianship has traditionally involved the collection, organization, storage, retrieval and dissemination of these documents--in other words, librarians are intimately concerned with documentation. (p. 123)

Bohnert, 1974:

> Most librarians will recognize themselves [in the theory] as the full-time delegates who must handle document searches of all kinds.
>
> . . . .
>
> Librarians, or full-time delegates, are necessary because most of what is read is not addressed to any particular person and most is read at a time and place chosen by the reader, not by the originator.

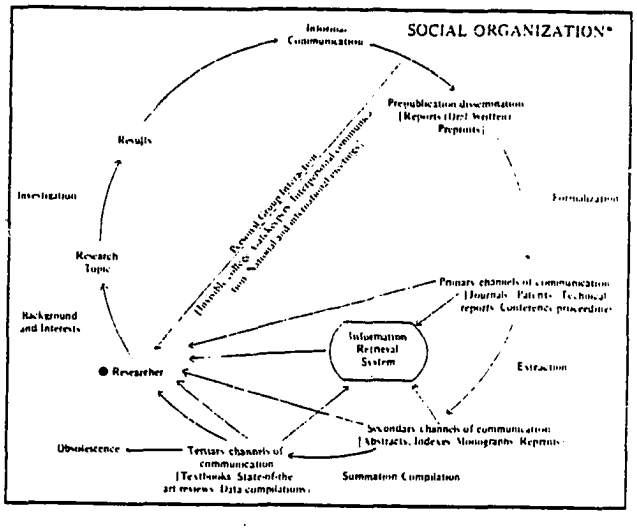
> A librarian's work begins whenever someone requests aid in finding a copy of a document. He provides service by identifying appropriate documents, if any are known to exist, and by providing copies of identified documents, if any are available. (p. 210)

Ghosh, 1974:

> Documentation is the art and science of locating, selecting, acquiring, classifying, cataloguing, annotating and preserving the records and communications of new ideas and thoughts, as well as retrieving them exhaustively and expendiously, in need and on demand. In other words, documentation is no more than applied and specialized librarianship. (p. 185)

Waldhart and Waldhart, 1975:

> While the primary audience of concern is the library and information science community, it is hoped that the bibliography will also serve as a useful source of information to individuals within specific substantive disciplines (e.g., chemstiry, physics, psychology, sociology, engineering, etc.) who are responsibie for the management of communication systems.
>
> . . . .
>
> A modified version of the Research Information Cycle . . . is presented . . . in an attempt to delineate those aspects of the communication system of the sciences, social sciences, and technology that have received emphasis in the development of this reference. In general, only those studies whose subjects were scientists, social scientists, or technologists were selected for inclusion, while the analysis, design, and operation of information storage and retrieval systems, although important to the overall communication process, were considered outside the scope of this bibliography. (p. 8)
>
> . . . .



(p. 9)

7.3. Conjunctional Definitions about Objects and People: To transfer

Shera, 1957:

> [Documentation] refers to that form of bibliographic organization, or librarianship if you will, that is concerned with the systematic mobilization of the total graphic resources of society for improving the scholarship of the culture. Stated somewhat more precisely documentation may be defined as that aspect of librarianship which is concerned with the organization and dissemination of graphic records for their most efficient use within and among groups of specialists to the end that they will receive, in a manner as effective as possible, the data and other information that they require for the prosecution of their work. In this ancient catalysis between man and the written word the documentalist and the librarian are specialists, each in his own right, in the communication of recorded information. (p. 188)

Palmer and Foskett, 1958:

> The basic techniques of the librarian and the information officer are the same, . . . (p. 1495)
>
> . . . .
>
> Some . . . declare that there is no difference at all between a special librarian and an information officer.
>
> . . . .
>
> Careful examination of the kinds of work they [librarians employed in special libraries devoted to the organisation and dissemination of scientific and technological information] engage in, and comparison with that of librarians working in other fields, leads us to conclude that there are certain basic techniques common to workers in all kinds of libraries, and that these are susceptible to development to meet the varying needs of different kinds of libraries. These techniques are (1) organisation of knowledge through schemes of systematic classification, through catalogues and through indexing, (2) the dispensing of information in response to enquiries, through enquiry techniques and bibliographical research, (3) the dissemination of information in anticipation of needs through a study of the work of the research staff, the preparation of displays, bibliographies, abstracts, and so on, up to and including full-scale literature surveys, (4) the organisation of an integrated library and information service, to deploy staff and resources to achieve these ends. (p. 1496)
>
> . . . .
>
> Our experience has convinced us that the profession of librarian and information officer is one, using the same kinds of materials and techniques, even if not always in the same way. We also believe that, contrary to what is sometimes maintained, there is no characteristic peculiar to scientific literature that necessitates a distinct profession in that field. The services given to scientists by librarians, information officers, literature chemists, etc., are no less needed in other fields of knowledge, and will without any doubt develop in a similar manner. (p. 1500)

Verhoef, 1960:

> According to this [FID] definition the three main functions of documentation are: to collect, to order and to disseminate. (p. 193)
> . . . .
> There will be little doubt among documentalists and librarians that collecting printed documents is a primary task of the librarian.
> . . . .
> There will be little opposition to the statement that literature searching is . . . one of his main tasks, if not his only one. Quite obviously this work cannot be properly done if gaps exist in the collection. Thus even in special libraries where a librarian is in charge of the collection, it would be unrealistic not to take into account the experience of the documentalist. The documentalist's duty, then, is to make a careful analysis of the missing literature so that his advice has real value. Thus, in what we refer to as the 'special' library, an important task is reserved for the documentalist, so that collection is a function, if a restricted one, of documentation.
> . . . .
> On the whole, documentalist and librarian are agreed that cataloguing falls exclusively within the scope of librarianship.
> There is less unity of opinion with regard to classification, for both disciplines claim that it lies within their domain. (p. 194)
> . . . .
> Undoubtedly the main task of documentation is the dissemination of literature. The differences of opinion which arise between librarians and documentalists over this part of the definition may be caused by the braod meaning ascribed to it. The librarian states correctly that it can hardly be the intention to collect literature without bringing it to the attention of the potential user, although this may be true of private collections. However, collections for which public funds are used and . . . must be made accessible to the student and assistance in searching for literature should be provided. This purely passive attitude is insufficient in research and industry; in fact the need for active dissemination of information on available literature has led to what seems to me to be the most important task of documentation. The question whether active dissemination belongs to documentation or not has often been discussed. In scientific libraries active dissemination may be considered to be the task of the librarian, but I would object to this point of view being extended to special libraries.
> . . . .
> This does not mean of course that making literature accessible and disseminating it is not the task of the librarian. In principle there are few arguments against the librarian, as keeper of the collection, being in charge of its dissemination also. However, the need for rapidity is so important and the mass of publications so overwhelming that perfect dissemination demands specialization. (p. 195)
> . . . .
> The library's task is confined to having the relevant literature available. (p. 196)

Kent, 1961:

> It has been said that documentation can be defined as librarianship in high gear. The processes, or unit operations, of documentation may be considered to coincide completely or partially with those of librarianship, depending upon how narrowly or broadly a particular documentalist or librarian views his field.
>
> . . . .
>
> But despite evidence to the contrary, the author is convinced that the gap between documentation and library practice is narrowing and that the definition that in 1956 clearly distinguished documentation from librarianship no longer serves as well as it was once thought to.
>
> . . . .
>
> The more successful documentation systems have sound basic principles that are in common with those of sound library operations. (p. 224)
>
> . . . .
>
> The various literature searching and documentation developments, although masquerading under differing labels, have at least a single common purpose--to facilitate the communication of knowledge across barriers of time, space, and language. A subsidiary common purpose involves the desire to conduct in the most economical and effective manner the various unit operations involved in achieving this communication. (p. 233)

Chapin and Shilling, 1962:

> Documentation--librarianship, documentalist--librarian, document retrieval--information retrieval, information centers--libraries: these are all terms which might well be included on a psychologist's scale. Once the terms are defined, we find that some people are engaged in the science (or art) of collecting, storing, analyzing, retrieving, and disseminating information. We have no wish to become involved in semantics. During the battle of definitions a war might be lost.
>
> There are differences which are easily recognizable between some of the above contrasting terms. For example, the typical library is still a place for the storage of printed information in the form of journals, monographs and books; whereas the information center, as envisioned for the future, would store information in subject areas. In this manner questions could be answered directly concerning not only subject areas of interest to the inquirer, but related questions such as who is doing what research, and where the research is being done. (p. 410)
>
> . . . .
>
> The librarians and the information specialists must necessarily unite if the scientists are to be provided the information services which they need. Unification will only come when we can all see and understand the task before us. (p. 413)

Foskett, 1965:

> Librarianship has always been the profession of looking after the records of civilization, . . . (p. ix) Shera's thesis is that 'documentation'-- the extension of librarianship from the world of books to the world of information--is more than the mere preserving of information, necessary though that still is. It means also the dissemination of information; it means taking the initiative in creating channels along which information may pass quickly to those who can use it. (pp. ix-x)
>
> . . . .
>
> Progress depends on the better ordering of lines of communication, in all fields; and librarians occupy key positions on these lines. (p. xiv)
>
> . . . .
>
> The very nature of a special library and its documentation service stems from the librarian's membership of a research team, fully informed about the several projects, partaking of the general subject knowledge and experience of the other members, but bringing to it his own specialist expertise. This consists not merely of reading technical literature from a particular point of view, as some would claim, but of organizing the information in it so that it gets to the right readers as quickly as possible, and so that it can be recalled in response to future needs. (p. xv)
>
> . . . .
>
> If librarianship has a true claim to professional status it is because we can demonstrate that practice in libraries derives from basic principles that are arrived at through systematic study, and which are capable of being modified through practical experiment. (p. xviii)

Swank, 1965:

> The problems, as I see them, arise largely from changes in the nature and mission of librarianship itself. (p. 1)
>
> . . . .
>
> First is the expansion of librarianship, with respect not so much to its size as to the range of functions within it and of interests without. By functions within I mean new or alternative or more intensive kinds of services--selective dissemination of information to readers, the delivery of photocopies to offices and laboratories, literature searching, and other activities of which many are embraced by the rubric "documentation". By interests without I mean other fields of information service, such as information centers (as Weinberg defined them), data banks (in social and political fields), management information systems (in business), and command and control systems (in the military). The growing use of computers in data processing for government, business, and industry has already demonstrated the urgent need, and the applicability, of library skills in significant fields far from the four walls of the library. (p. 2)

Fairthorne, 1967:

> [Within] the field of Notification (mention and delivery of recorded messages to users) there are twenty basic activities formed by choosing triads from the six variables, Message, Code, Channel, Source, Destination, and Designation.
>
> "Flow" has meaning only when two such triads have two variables in common, forming a tetrad. Then flow or correspondence between any pair of variables is inextricable from a conjugate flow or correspondence between the other pair. (p. 710)
>
> . . . .
>
> Clearly the scope of Signaling [the activity of devising patterns of signals appropriate to a particular physical mode of communication in order to indicate choices made from a particular set of messages (p. 711)] is not sufficient for Information or Message Transfer systems.
>
> . . . .
>
> When considered by itself the triad, Source, Destination, Designation, constitutes Discourse as such. That is, it suffices for study of those aspects of communication that are independent of particular modes of representation on the one hand, and particular characteristics (including existence) of what is talked about on the other.
>
> . . . .
>
> We are thus within the black box of Discourse and outside the block box of Signaling (including printing, reproduction, and so on).
>
> We use the latter; we are used by the former. That is, we are not authors or printers or telegraphists, nor do we use the discourse. We only mention it or deliver it to potential users.
>
> . . . .
>
> The next step is to isolate the simplest type of activity that properly belongs to all of documentation, informational activities or sciences, library work, record management, and the like, in their usually accepted senses.
>
> . . . .
>
> The lowest level task common to all these, but above the level of file organization, reproduction, and other noninterpretative tasks, is what is here called "Notification," that is, the task of alleviating the situation where a reader has to receive messages not by direct communication or by personal inspection of documents (or other linguistic records), but by specifying to some delegate his requirements in terms of document characteristics such as author, bibliographical or textual description, physical format, or topic, subject matter, interest. (p. 713)
>
> In other words, Notification covers techniques for relating Destination to Message in terms of one or more of Source, Code, Channel, or Designation. If the Notification service not only tells ("informs") the Destination (reader, user) of messages, but also supplies, reproduces, or utters them, the activity becomes, in Lea M. Bohnert's words, "Message Delivery."
>
> . . . .
>
> Notification is the lowest level complete documentary, or informational, activity. (p. 714)
>
> . . . .

. . . .

To some extent one can talk meaningfully about "information flow" in relation to the six flows relating Destination to Message in notification activities. . . . (p. 719)

. . . .

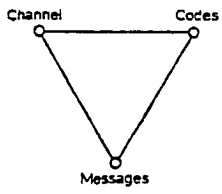


FIG. 1. Signaling

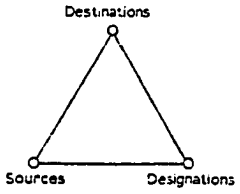


FIG. 2. Discourse

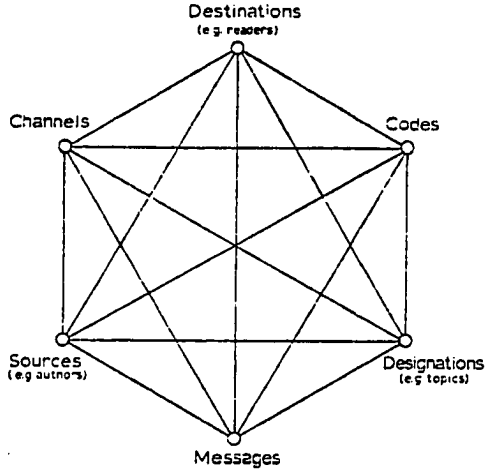


FIG. 3. Notification (p. 715)

Harvey, 1967:

> Rather than studying the information producer or user, or the information itself (which is more common), the middle-man or catalyst--the information scientist or information specialist--serving the two will be viewed. (p. 419)
>
> . . . .
>
> [Information science] is the study of the responsibilities and skills in indexing, abstracting, writing, editing, translating, information center administration, patent searching, literature searching, systems analysis, and information research.
>
> . . . .
>
> [This] particular definition of information science can be restated as the study of the responsibilities and activities of people who work in modern information centers or in teaching or research concerning them.
>
> . . . .
>
> Another definition clearly distinguishes information science from library science and puts each into its proper perspective: information science covers the entire continuum of information transfer--that is, the flow or handling of information from the writing of literature by an author; through its editing, printing,

publishing, and distribution by the publisher; through indexing, abstracting, and distribution in reference journals; through acquisition, organization, storage, and promotion of use in an information center; and through its use by another author and, perhaps, the production of new literature.

. . . .

In 1966 most librarians concentrated on only a small portion of the broad spectrum, namely the selection, acquisition, organization, and storage of traditional books and periodicals in libraries. From this standpoint, library science covers only a portion of the continuum of information science and is therefore a specialty within it, though certainly one of the oldest and most elaborated of its specialities. (p. 422)

Taylor, 1967:

With all of this it is important to remember that the library is but one application of information science. However, if we use a generic concept of librarianship, as encompassing the processing and dissemination of formalized messages, embedded in a larger communication context, librarians will have more freedom of movement and a more effective and realistic pedagogical and academic position. (p. 47)

Dembowska, 1968:

The theory of documentation--called by Otlet bibliology or documentology--is concerned with the systematization of knowledge on documentation, with definition of notions and with terminology, with the determination of the subject of investigations, with determination of the relation of documentology to other sciences wtihin the general framework of science classification, with the organization of research and studies, with the history of bibliological sciences. (pp. 56-57)

. . . .

Scientific research should then establish rational methods for collecting documents, presentation of various types of informational materials, storage, retrieval and dissemination of information. A particularly important task for the theory of scientific information consists in the introduction of systems of mechanization and automatization of information processes which will require solution of many theoretical and technical problems.

The theory of scientific information is also concerned with the physical forms of communicating information--that is, above all with verbal documents. Therefore, the creation of the most rational forms and methods of recording the results of scientific knowledge is one of essential tasks of this new discipline.

The theory of scientific information, as every scientific discipline, is linked with other fields. Primarily it has to some extent a common--though not coincident--subject with bibliography and library science. That however which is the main subject of investigations of bibliography and library science, it is the methods of preparing lists of literature and the problems of library organization and activities, constitutes only a small sector of

the scope of investigations of the theory of scientific information. (p. 110)

. . . .

Documentation is the transfer of information through the medium of documents; the central reservoirs of documents are libraries. (p. 111)

. . . .

The broad conception--as presented above--of "information science" or "theory of scientific information" expresses the trend to integrate the problems which are of interest for various disciplines connected with communication of scientific information. These include the problems of scientific editoriship, librarianship, bibliography, and to some extent also--of archivistics and meseum science (as to the methods of organization of collections of special types of documents).

. . . .

However, the broad conception of the problems of documentation and scientific information does not contradict the autonomy of individual disciplines and of corresponding fields of practical activity--editorship (scientific), librarianship, bibliography--which being interrelated by a common aim and in part using common methods, have their own problems arising as a result of the process of specialization and of the division of the tasks for the realization of a common objective--the communication of scientific information.

Within the limits of documentation and scientific information in a broad meaning one can differentiate complexes of particular activities, pertaining to successive phases of the flow of information from its source to the user (recipient). These are the activities connected with: 1) recording information in the form of a document; 2) collecting and making accessible documents (together with such intermediate stages as: listing, cataloguing, classifying, storage); 3) preparing informational materials (secondary documents); 4) dissemination of information. (pp. 115-116)

. . . .

[The] difference between librarianship and documentation is a quantitative difference, consisting in different proportions between the two categories of functions performed, and in a different hierarchy of tasks.

The basic responsibility of libraries is to gather their collections and to make them accessible, and hence the greater part of library routine work is connected with those tasks; on the other hand, the essential responsibility of documentation and information centers is the preparation of information material and the communication of information.

. . . .

It should, however, be emphasized that the links between librarianship and documentation are being constantly tightened, because contemporary libraries more and more widen and deepen their information services, . . . (p. 117)

Nitecki, 1968:

My approach is a philosophical attempt at synthesis, a macroscopic overview aiming at the definition of librarianship which would include, in addition to the transmission of information, a wide range of activities such as selection and acquisiton of books and service to the individual library patron. (p. 373)

Artandi, 1969:

> A number of fundamental concepts [of information science and technology] cut across library school curricula, and . . . can be grouped in the following broad categories:
>
> 1. the processes involved in communication, the nature and behavior of information, the theory of document organization and of data organization, patterns of information transfer and existing formal and informal information systems in the broad sense of the word, methods of research, and problems of computer manipulation of text for such purposes as indexing, abstracting, translation, and querying;
>
> 2. the general concept of systems, their behavior, design, and operation, the study of systems in terms of their efficiency and their value to the users, the point of view which leads to the analysis of needs and situations prior to action and to the clear-cut definitions of objectives;
>
> 3. the relevance and the potential of computers to the field, as well as their limitations, thinking which will lead to informed judgments concerning the application of computers in a variety of situations. (p. 338)

Guiliano, 1969:

> I would like to see the field of librarianship defined in terms of the knowledge transfer function, rather than in terms of the library institution.
>
> . . . .
>
> The knowledge transfer function encompasses those procedures necessary and appropriate for the assembling of knowledge, its systematic organization, its restructuring and representation, its storage, its retrieval and dissemination. (p. 344)

Landau, 1969:

> This chapter is directed to those whose vocation (or avocation) is information. While we may call ourselves librarians, information scientists or technologists, abstractors and indexers, documentalists, IS&R specialists, literature searchers, and so forth, we all have one thing in common: We are either directly or indirectly involved in the dissemination of information. As disseminators, we are interested in far more than the techniques for transmission of information from one point to another. Despite McLuhan's statement that "the medium is the message," we must concern ourselves with not only the means of document dissemination, but also the content and value of the documents we disseminate. . . . A disseminator should think of himself as a selective switching center, inputting data, evaluating them, selecting worthy items, and directing and controlling their transmission to a target: the reader. (p. 229)

Benge, 1970:

> There is small profit in examining the available definitions [of documentation] because we should find in every case that the definition would include some or all of the four activities . . . . characteristic of librarianship [collection, preservation, organization, and dissemination]. The most succinct of these descriptions has been quoted from the Schweizer lexicon: 'The handling and organisation of scholarly materials'. This serves our purpose very well, since these seven words include the word 'scholarly'. Similarly, the definition offered by S.C. Bradford includes the words 'creative specialist'. We need go no further than this to arrive at the conclusion that, while librarianship is concerned with all types of material for all types of user, documentation on the other hand is primarily concerned with the world of specialised information, scholarship and research. In other words, documentation is simply this information aspect or function of librarianship carried out in depth. (pp. 228-229)
>
> . . . .
>
> [The] documentalists' case that they are a separate profession must rest on the claim that their techniques are so highly developed that they have gone beyond the more limited realm of librarianship. It is this claim which cannot be substantiated, except (and this is a most important proviso) in countries where librarianship in the modern sense does not exist. (p. 231)
>
> . . . .
>
> [Documentation,] which is concerned with the dissemination of information, should be regarded as an essential part of librarianship, and . . . if it is not, librarians may be reduced to their primitive condition of custodian, . . . (p. 234)

White, 1970:

> During the last twenty years there has been a continuing growth in an activity which studiously avoids calling itself librarianship, and which, under an original name of documentation and later information science and technology, has proposed approaches to information handling and analysis which have aimed at interrelating more directly with the user and his expanded requirements. (p. 551)
>
> . . . .
>
> [The] new discipline frequently accepts as a positive value something librarianship has always deplored: the "lazy" user who expects his work to be done for him. Service to this lazy user, who may not be so much lazy as busy, is one of the cornerstones of the new approach to information service, and it contradicts the ethic of educational librarianship, which values study and scholarship as self-evidently good. (p. 552)
>
> . . . .
>
> We can, of course, continue to be interchangeable generalists if we insist on retaining our own narrowed definition of librarianship. (p. 553)

Foskett, 1972:

> It may seem a far cry from the small public library to the information services of great corporations, but fundamentally these all serve the same social purpose: they all help to achieve the transfer of organised thought from one human mind to another.
> . . . .
> I speak as one committed to the view of a unified profession which includes librarians of all kinds as well as information specialists. (p. 28)
> . . . .
> When I speak of "information science", therefore, I mean the discipline that is emerging from a cross-fertilisation of ideas involving the ancient art of librarianship, the new art of computing, the arts of the new media of communication, and those sciences such as psychology and linguistics, which in their modern forms bear directly on all problems of communication--the transfer of organised thought. (p. 29)
> . . . .
> The traditional role of the librarian, since antiquity, has been that of a curator of records, of one sort or another, from the astronomical and meteorological data of Ancient Egypt to the sacred books of many different civilisations. The curators did not only look after the records, they also prevented them from falling into the wrong hands. Since they served a ruling elite, they in fact made it possible for civlisation to progress, because the elite no longer needed to rely solely on their memories in order to appe Knowledge could be cumulated, and the techniques of librarianship were originally evolved to identify and retrieve documents for their information function analogous to that of the human memory.
> . . . .
> We now have many more writers, many more subjects, more libraries, more users. These have cumulated to the extent of producing a qualitative change in the part to be played by the information officer who ca-not remain a curator, but must act in a more positive way to promote the communication of ideas. (p. 33)

Grosch, 1972:

> [By 1972, it] had become apparent to many . . . that documentation (or information science) and librarianship were quite simila Today, in the recent literature, information science has repl ed the term documentation in frequency of use. And, furthermore, the similarity between library and information science makes it difficult to tell them apart since all information storage, retrieval, and transfer is really based on foundations laid down for generations within the field of librarianship. (p. 266)
> . . . .
> [Special] librarians have an increased interest, need, and desire for understanding, practicing, and evolving the state-fo-the-art in information science and the application of the newest technological discoveries to the process of information transfer. (p. 269)

Machlewska, 1972:

> [The] activity of scientific [information] workers can be divided into three groups: the first group of functions includes:
>
> The selection, classification and documentational processing of primary documents; the selection and transmission of processed information according to the differentiated needs of groups of users; initiating activities connected with information within the scope of own education and of the serviced field of science or national economy. (p. 94)
>
> . . . .
>
> The second group of functions includes:
>
> The selection of appropriate information retrieval systems and of working methods and technical media for tasks performance in specified conditions of scientific, industrial or management activities; taking into account the economic aspect; the supervision of the indexing of documents, the editing of processed information, the transmission of information by written and audio-visual methods.
>
> These activities should be performed by specialists with an academic background (M.A. or M.S.) in the field of information science or library science. . . .
>
> . . . .
>
> The third group is concerned with the research on information theory and techniques.
>
> This work must be performed by specialists graduated in the field of information or library science and specialists from other disciplines . . . in the field of information. (p. 95)

Merta, 1972:

> [The] differences in the denomination of the profession and of the activity have theoretical consequences, too. The Federal Republik of Germany and the German Democratic Republik use the terms document, documentalist, documentation and information. This leads to complete theoretical confusion. In Czechoslovakia, some scientists and engineers do not see any difference between documentalists and librarians. They are people dealing mostly with documents and materials of information. . . . In this respect there is no difference whatever between processing a document and processing, transferring and disseminating the semantic information contained by documents. In this respect no distinction is made between an information scientist and a special librarian, whose task is to transfer the semantic information contained in a document. But there is another communication circuit in transferring information. It may be described as cultural, educational and aesthetic information. It may be and it means responsibility for the user and involves the inclusion in the curriculum of subjects connected with education, aesthetics, etc., our discipline being profoundly connected with their methodology. The Seminar should find a term denoting our profession and its theory. (p. 49)

Lancaster, 1973:

> The major steps in the documentary information transfer process are well displayed in Figure 1, adapted from King and Bryant [1971]. Librarians should be interested in all of the activities illustrated here, although they are most concerned with the acquisition and storage of documents, their identification and location (including cataloging, indexing, abstracting, classification and searching processes) and their physical presentation to potential users.
>
> It can be seen, from the previously cited definition that information science is very broad in scope and that, besides librarians, many other professionals are involved in information transfer activities, including the activities we have referred to as documentation. (p. 123)
>
> . . . .

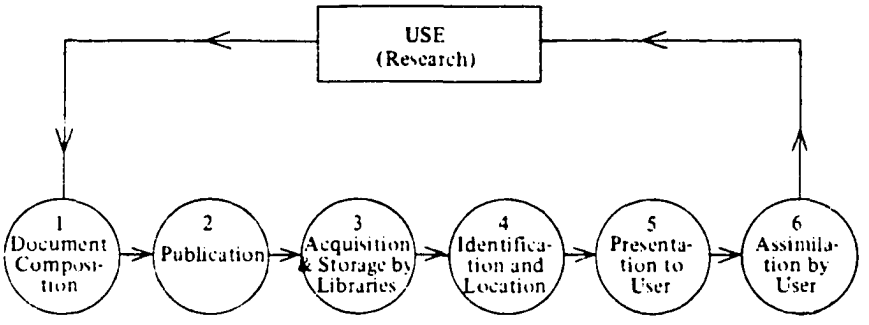


Figure 1

(p. 123)

United States National Commission on Libraries and Information Science, 1973:

> While the libraries and information centers of the country do not constitute a system in the formal sense, they do in a practical sense, and it takes only a glance at the explosive development of library consortia and networks to realize that we are moving toward an era in which there will be more closely articulated mechanisms for transferring information from the generators of information to its intended users. To develop such mechanisms--whether or not we wish to call them a "system"--very careful planning must be done, and there must be adequate definition of the library and information services that ought to be provided to our citizens. (p. 2)

Vickery, 1973:

> Librarianship and documentation are developing into, or being absorbed by, a new discipline called "information science and technology." (p. 147)
>
> . . . .
>
> [Information science] is concerned with that aspect of human communication the purpose of which is to inform; which is rarely a single act, direct from source to receiver, but is usually mediated, a chain of acts through intermediary sources, and which involves search activities by all parties concerned.

. . . .
The user seeks through many libraries, secondary guides, and intermediary and primary publications for needed information.
. . . .

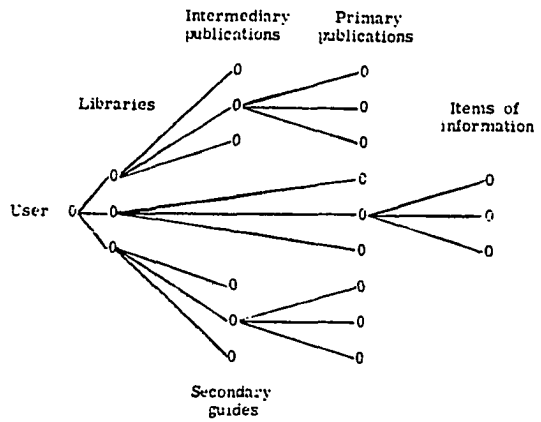


Figure 2. (p. 153)

Havard-Williams and Franz, 1974:

> The quantity of information and the complexity of modern knowledge transfer has led to the growth of information science and of library studies or library science. (p. 4)
> . . . .
> No longer can the librarian or the information officer be a self-effacing modest creature hidden by the books. . . . With the development of electronic data processing, depth classification demanding real subject knowledge, specialization both in terms of subject and of function not only in national, academic libraries but also in the larger public libraries, as well as in colleges and polytechnics, the whole concept of library and information service provision has broadened, not only developing within itself, but also joining up with computer science, social studies and the whole range of subjects in which there may be bibliographical and information inquiries. Information science, and library studies, are now characterized not only by their "core" but also by their interdisciplinarity, . . . (p. 5)
> . . . .
> Personnel is the key to modern information-handling.
> . . . .
> Information work exists to make the transfer of knowledge more effective. (p. 27)

Saracevic, 1974:

> Information science is a multi-disciplinary field because of the complexity of the phenomena, processes and systems under consideration.
> At the base of information science is a concern about man's communication processes in general, and about the most complex and, in value, the most precious communication there is--the communication of knowledge--in particular. Communication is a basic process which underlies and permeates all activity of people as social beings. (pp. 3-4)

. . . .

A communication process can be thought of as a sequence of events resulting in the transmission of something called information from one object (usually referred to as the source) to another (the destination). We may not know what information is but we can study its various manifestations, (e.g., knowledge, literature) properties and effects. Thus, information may be viewed as a complex phenomenon with a variety of physical, biological, social and behavioral properties which may be studied in . . . that dynamic and mutual interaction which shows their interrelation and interdependence. In other words, the basic subject matter of information science is the study of the behavior, properties and effects of information in all its facets and study of a variety of communication processes affecting and being affected by human beings. (pp. 5-6)

. . . .

Information retrieval is a process within a communication process, that is, it is a mechanism for establishing an effective contract between sources (e.g., scientific and technical literature) and destinations (e.g., scientists, engineers). By effective it is meant that material relayed to the users will be relevant.

Information retrieval was characterized by (a) technological developments: application of computers; (b) methodological developments: among others, various types of indexing and searching; and (c) systems development: application of the systems approach. In many respects information retrieval systems and libraries have common features but their techniques may differ considerably.

. . . .

Information retrieval systems and libraries are systems which acquire, organize and store recorded knowledge for the purpose of communication of that knowledge to users. It follows that fundamental to information retrieval systems and libraries are not only the processes and techniques for acquiring, representing, organizing, storing and disseminating, but even more so, the properties and effects of knowledge and its representation, the literature and the properties of communication processes in which the users are involved. (p. 6)

. . . .

[The] basic phenomena under investigation in information science . . . [are] the nature and properties of information and of communication processes. (p. 7)

Sharma, 1974:

It was in the nineteenth century that Library Science entered in to a new phase of its historical development and that was 'Dissemination of the recorded knowledge acquired and organized in the library'. . . . By dissemination we mean passing on or communication of information to the scholar. (p. 130)

. . . .

The documentation work includes the process of preparing a documentation list. (p. 131)

. . . .

Traditionally and conventionally Bibliography contains the list of books, which is known as Macro Literature, whereas documentation deals with periodical and other micro-literature. (p. 133)

. . . .

Thus it is a historical fact that documentation has evolved out of library science. . . . but the librarians got alerted very soon and took the responsibility of dissemination of information through documentation. (p. 134)

. . . .

Documentation is the art and science of locating, selecting, acquiring, classifying, cataloguing, annotating and preserving the records and communications of new ideas and thoughts, as well as retrieving them exhaustively and expendiously, in need and on demand. In other words, documentation is no more than applied and specialized librarianship. (p. 185)

Taylor, 1974:

Libraries are part of a larger information infra-structure. A failure to understand the operation of the whole system and the role a library can play in the information transfer process will tend to isolate the library even more than it presently is. Such a failure will also strengthen alternative agencies and services more sensitive to real user needs. (p. 3)

. . . .

[The basic need is] an understanding of the total system of information transfer in society--how, why, what, where, and when.

. . . .

The archival function [of the library] is a necessary one, but in order to meet the needs of information service it will be necessary to develop new methods of collecting, organizing, and purging highly dynamic information. Too much attention is still paid to formal information packages, i.e. books and media packages, which satisfy only a small portion of the real demands for information. The present design of information systems are dictated by the package rather than by the needs of people. They are both necessary. (p. 4)

. . . .

[The] library as a societal agency--especially the public library--may be the one agency in society with the necessary neutrality and cultural halo to act as a true information service for all types of audiences in society. (pp. 4-5)

. . . .

[There] is a desperate and pressing need for persons who can deal with the total information process. These are persons for whom the process and movement of messages are important, not the specific device (book, computer, or video tape), nor the particular agency (library, computer utility, or educational system). (p. 17)

. . . .

[Both] operational and research personnel [should be] competent to design, manage, and evaluate information systems and networks and who at the same time are sensitive to human needs for information at all levels of society. (pp. 19-20)

Foskett, 1975:

> The papers and discussions at this seminar [on "Information Science as an Emergent Discipline" held at Veszprem, Hungary, 1972] revealed a hopeful unity of outlook amidst a diversity of programmes and approaches; representatives of traditional librarianship and advocates of the utmost mechanization of information systems found sufficient community of interest to justify a mood of cautious optimism for the future. (p. 23)
>
> . . . .
>
> [The] emphasis in our curricula still tends to be on the role of records (of all kinds) in the transfer of knowledge. . . . [We] have to do with the social role of the librarian and information specialist in collecting and disseminating information in response to the needs of users. It does not affect the nature of the role whether these users are a local community served by a public library, a university of teachers and students, or the scientific research staff of a technical industry. (p. 24)

Wersig and Neveling, 1975:

> 'Information science', 'informatics' and whatever else it is called is a newly emerged field of study whose first consciousness of being a discipline dates back perhaps to the late fifties. . . .
>
> 'Information science' did not develop out of another field of study (like psychology) or from the intersection of two fields (like biochemistry), but out of the needs of an area of practical work, called 'documentation' or 'information retrieval'. (p. 127)
>
> . . . .
>
> With the increasing relevance of science for industrial development in the 19th Century (first industrial revolution), specialization of science began, more sciences were produced and needed, and scientificcommunication grew and grew. This process is still under way. Briefly stated, this led to a situation where an 'anonymous' group emerged between the producers of data, findings and discoveries on the one hand and those people needing the data, findings and discoveries on the other. Consequently, in the process of the division of labour a new field of practical activity emerged and an older profession started to change its definition. The information people appeared--with different titles in different countries, but similar in function. And this function is--again described very simply--to ensure that those people needing some piece of knowledge for their scientific and technical work (now not restricted to science and technology but including 'occupational roles' or roles even less restricted) will get it, regardless of whether they actively search for it or not. This is not a widespread philosophy but a social function derivable from historical development. (pp. 133-134)
>
> . . . .
>
> Nowadays the problem of transmitting knowledge to those who need it is a social responsibility, and this social responsibility seems to be the real background of'information science'. (p. 134)

. . . .

[Similar] disciplines are library science, museology, archivistics, education (all catering for different clienteles according to different information needs). (p. 138)

. . . .

All these disciplines [psychology of information, sociology of information, economics of information, politics of information, information technology] concentrate on the study of information processes (i.e. communication processes aimed at the reduction of uncertainty) or components of them. Therefore it is possible to call all of them 'information sciences' (the whole system of 'information sciences' is given in Fig. 1). (p. 139)

. . . .

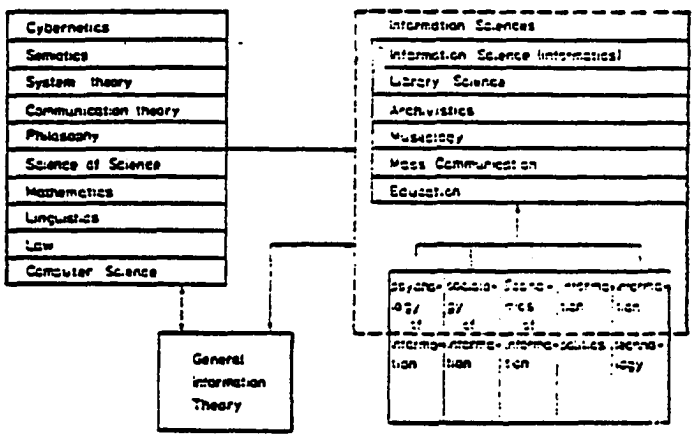


Fig. 1. The system of information sciences.

(p. 139)

Foskett, 1976:

[It] has not proved possible, nor deemed desirable, to separate Library Science from Information Science. While one can readily distinguish, for example, between Historical Bibliography and Rare Book Librarianship on the one hand, and Computer Science on the other, it is clear from the actual [university curricular] programmes submitted in answer to the questionnaire, that the majority include a whole range of subjects common to both areas. We are justified in concluding, on the basis of this evidence, that we have to deal with a variety of subjects, certainly, but that together they represent a continuous spectrum rather than two sets of completely separate studies. The "art of the book" and curatorship represent one end of the spectrum, while automatic indexing and retrieval systems represent the other.

. . . .

[It] has become evident during the last twenty years that the traditional art of librarianship has widened its vision and become aware of its responsibility for acting in a positive way towards its material, documents of all kinds and the information they contain. Librarians have much to learn from these new technical advances, but this does not involve changing into some other type of professional. We are all engaged in a social activity, namely, facilitating the transfer of knowledge from one human mind to

another. It may, perhaps, be remarked in passing that influence might well pass in the opposite direction also: many computer and other technical specialists are woefully ignorant both of the real problems of information handling, and of their own literature. (p. 2)

. . . .

[We] have to do with the social role of the librarian and information specialist in facilitating the collection and dissemination of information in response to the needs of particular groups of users. (p. 4)

Galvin, 1976:

The growth and development of information science as a field of scholarly investigation also holds enormous promise for the expansion of the empirical knowledge base which must come to undergird librarianship . . . centering on broad, theoretical constructs applicable in a wide variety of information transfer environments.

. . . .

The future of education for librarianship and the related information professions is rich in its potential for a fuller contribution to the improvement of information delivery service. (p. 277)

Judge, 1976:

The term "Information Scientist" was coined in the U.K. to identify a new class of scientist, the information scientist as distinct from the research scientist.

. . . .

I have dwelt on these origins only to emphasize the way in which the two kinds of information specialist, the practitioners and the research and development workers, became separated from the library end of the spectrum of communication workers, largely because of the unwillingness, some years ago, of librarians and documentalists to broaden their horizons and accept new functions, once these were identified by their customers.

. . . .

I have no doubt that information and library personnel belong together, as different specialists at different stages of an information transfer process. I believe that many librarians and information workers now think this way too. (p. 52)

Davis, 1977:

With respect to professional vs. academic and historical vs. scientific approaches [to library school curricula], there can be no question that librarianship traditionally derives from professional and historical concerns, whereas information science is more often associated with academic questions and scientific methodologies. This situation gives rise to the "Two Cultures" split, wherein those of a literary bent are allegedly pitted against the scientific and technological Philistines. (p. 20)

. . . .
[The] "Two Cultures" concept . . . overlooks the likely development of a Third Culture consisting largely of the social and behavioral sciences, ...

In any case, there seems to be little question that we have entered a post-industrial or cybernetic revolution, in which the information transfer process has assumed considerably more importance than the extension of muscle power through machines. If such a third culture does mature and flourish, then it seems quite reasonable to think that a new "interdiscipline" of library and information science, showing typical hybrid vigor, will become that culture's premier field. (p. 23)

Kirwin, 1977:

> [Mass-communication and business-information systems] are given relatively little attention in the information science literature. Yet whether we call ourselves library scientists, computer scientists, or communication scientists, we are all information scientists concerned with the communication of information. Our interests differ only in details such as transmission medium, message content, types of sources and receivers, and persuasive intent. (p. 24)

Saracevic, 1977:

> It is remarkable that library science took the path of searching in the sociological aspects of knowledge whereas information science was basically searching for its own foundations in terms of the communications process and information as a phenomenon. (p. 28)
> . . . .
> What are the basic processes and phenomena underlying the professional work of librarianship and information science; the existence of libraries (very broadly defined as all information systems); and which scientific investigations in information science are focused as problem areas (i.e., which are the scientific investigations to be pursued by information science)? The answer can easily be shown and justified as a problem of communication in general, and more specifically the process of communication of knowledge--and even more specifically, of the process of communication of recorded knowledge.
> . . . .
> In order to get definitions about libraries and information systems as systems, we have to provide a number of definitions of systems themselves. Taking all this together, including the definitions provided for the concepts, we can then justify the models of communication in general, and out of that the model of knowledge communication, and out of that a model of the library as a knowledge communication system. (p. 29)

. . . .

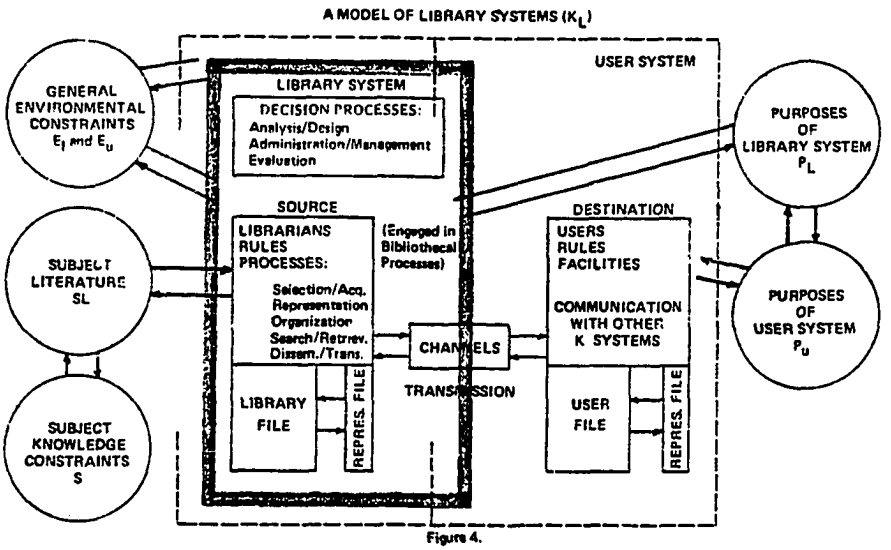


Figure 4.

(p. 33, reduced)

Kajberg and Harbo, 1978:

> During recent years the concept of one information profession, the desirability of eliminating the artificial barriers between librarianship, documentation and other information activity areas, has received much attention in national contexts as well as on an international scale. . . . The education of future information professionals in terms of the broadened concept of information activities implies careful analysis and developmental work, so as to isolate and describe those basic principles and methods in the information transfer area that are common to all information disciplines. (p. 479)
>
> . . . .
>
> What is important to us is to abandon the illusion that the information officer has more subject knowledge than his counterpart in research, education, administration or commerce, or equal subject expertise. What he has is more knowledge in a complementary field, information systems and transfer. In one respect, however, the information officer should have skills matching those of his client--in research--but the information officer's research should centre on information systems and transfer with a view to educating him for a situation similar to that of his clients: finding relevant information for solving a problem. (p. 480)

Saunders, 1978:

> [The] principal target groups [of the educational courses] are those which are variously known as documentalists, information specialists, information scientists, librarians. (p. 5)
>
> . . . .
>
> In simple and very general terms the concern of information studies is with the transfer of knowledge, or information, or imaginative simuli [sic] from one human mind to another. This statement begs

> many questions of definition and ignores many of the subtleties which emerge from the fascinating and important discussions which abound in the theoretical literature of the field, but for the present purpose it provides an adequate indication of the bounds within which curriculum creation and development should be considered. (pp. 23-24)
>
> . . . .
>
> "Information" can be presented from the point of view of its genesis, or generation, its preservation, storage, retrieval and utilization. These aspects can be translated and presented in terms of the activities, mechanisms and institutions which collectively encompass the whole process of information transfer: for example, publishing, libraries and documentation units, information services, classification and indexing, resource sharing, and the like. (pp. 24-25)
>
> . . . .
>
> It is of great importance that from the beginning the information specialist should think of himself and his activities not in isolation, but as a link in the total communication chain; that he should see information resources in global rather than parochial terms. . . . (p. 25)

Galvin, 1980:

> Schools of librarianship do have the potential to broaden the scope of the education that they offer and to play a major role in the preparation of professionals to staff information organizations other than libraries. Librarianship has accumulated a very substantial body of knowledge and experience in the organization and dissemination of information. The business of libraries, their raison d'etre is, in fact, information transfer. The experience of library school graduates who have successfully applied their skills and knowledge to alternate information-related careers makes it clear that library science has a great deal to offer to the broader field of information. (p. 17)
>
> . . . .
>
> Moreover, graduates of a program oriented toward the broader range of the information professions would be far better prepared to help to bridge the alarming and growing gap that currently isolates librarianship from the larger information and communications communities.
>
> It seems clear that the greatest challenge to librarianship, and consequently to library education both currently and in the years ahead, is to come to terms with the new information technology. The technological revolution in computers and telecommunications over the last twenty years has brought about a basic change in the character of library operations. (p. 18)
>
> . . . .
>
> The challenge for librarianship now and in the future is to manage the full range of information technologies, from the manuscript to the floppy disk, so as to achieve maximum social utility. The challenge for library education is to prepare those who will be the successors of my generation of library professionals to respond effectively to both the demands and the opportunities of a knowledge-based society. (p. 25)

Garfield, 1980:

> Many of the functions [in information transfer] . . . fall within the domain of traditional librarianship. Is it possible to distinguish between the two disciplines? One idea that enjoys some popularity is that information science is a basic and research oriented discipline, while library science is its applied component. But this view is not universally accepted. Michael K. Buckland, University of California, Berkeley, notes that for most of the people who identify themselves as "information scientists," the discipline is very much applied.
>
> . . . .
>
> Many years ago, I solved this problem by calling myself an information engineer. However, I never heard anyone described as a library engineer.
>
> The same interdisciplinary quality that makes information science hard to define is also partly responsible for the current chaos in its teaching. During the 1960s, practitioners in a number of fields claimed the new discipline for their own. . . . [The] content of any information science curriculum is greatly influenced by the academic environment in which it is taught. (p. 6)

Karlén, 1980:

> The models reflect both an interpretation of an existing intrinsic pattern of known activities within smaller and larger centres common to several professions, and patterns of information activities in practitioners' information centres. (p. 141)
>
> . . . .

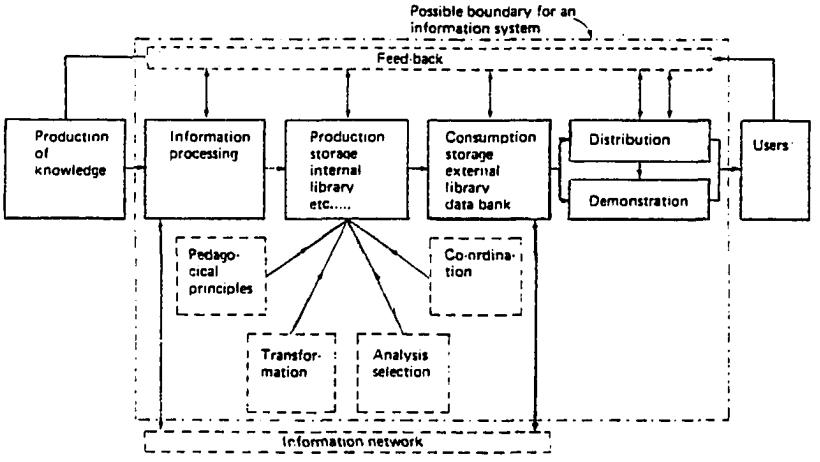


Fig. 1. Model of a building information and documention centre (from Karlén, [12]). (p. 142)

> . . . .

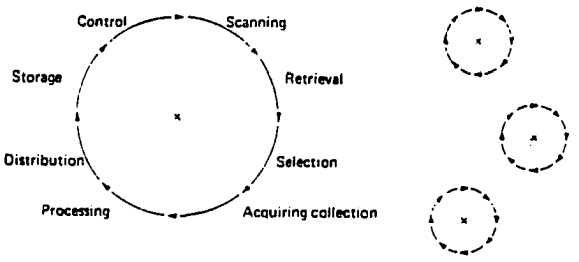


Fig. 2. Model of subsystems in an information centre, and of similar subsystems in smaller information systems (from Karlén [11]).

(p. 142)

. . . .

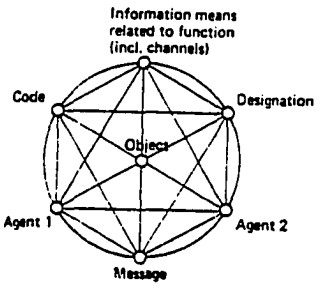


Fig. 19. An improved application of the ideas.

(p. 155)

. . . .

It seems relevant to draw attention to the models or schemes describing the basic functions of an information centre . . . and the discussion about similarities in the pattern of smaller or larger information systems. . . . In these two examples, and with the help of studies of the practical handling of an information centre, functions were recognized which together can be described in one model as in Fig. 28. . . . The feed-back function is established, but not shown. (p. 163)

. . . .

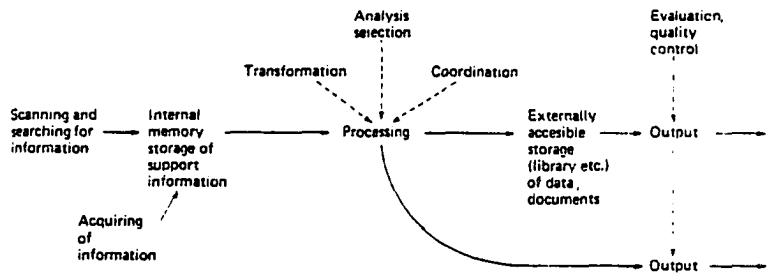


Fig. 28. Functions in a building centre information system (based on Karlén [1.12]).

(p. 163)

Greer and others, 1980:

In each of the daily interactions among . . . individuals performing their various roles, information is given out or mutually exchanged among those who interact. This process is defined as information transfer.

It is time for future information professionals to be exposed to the value of information in society, to be educated to systematically study the environment in which the information agency exists, analyze the various functions (independent and overlapping) that people in that environment are required to perform, and how the people performing each of those functions transfer (i.e. both receive and send) information. Only then will information professionals be able to design information systems, subsystems, and services as integral parts of the agency. (p. 373)

Kaske and Rush, 1980:

> Information science [in Webster's New Collegiate Dictionary] is defined as "the collection, classification, storage, retrieval, and dissemination of recorded knowledge treated both as a pure and as an applied science." This definition of information science is what many of us have been taught is the role of a library.
>
> . . . .
>
> Pierce Butler [1933] states . . . "the basic elements of librarianship consist in the accumulation of knowledge by society and its continuous transmission to the living generation so far as these processes are performed through the instrumentality of graphic [sensible] records." This definition is sufficient to encompass not only traditional views of library and information science but systems, information, and communication theory as well. It imposes no restriction on medium of recording or mode of transmission of knowledge, if the word graphic is change to sensible.
>
> The purpose of research in the library and information science field is to try to find the best methods of acquiring, organizing, storing, accessing, retrieving, and disseminating information (or data). In a more general sense, library and information science research is the study of the human communication process. (p. 317)

Lancaster, 1980:

> Not only must technological capabilities exist, they must be applied in imaginative and innovative ways to the solution of communication and information handling problems. (p. 11)
>
> . . . .
>
> If he [the scientist] needs to search an unfamiliar data base or conduct a search in a subject area tangential to his specialization, however, he may prefer to delegate the search to some information specialist (there will be on-line directories to help in this choice), who will probably provide him with some form of "information analysis" service. The specialist will interact on-line with the scientist to discover his true needs, will select and search the appropriate sources, will evaluate and edit the results, and then submit the evaluated results for on-line access by the customer. (pp. 14-15)
>
> . . . .
>
> While libraries may decline as institutions, and library technical services in particular will dwindle, remaining library activities will be highly service oriented. (p. 15)
>
> . . . .
>
> The librarian of tomorrow will become essentially an information consultant. . . . The explosion in the number and the diversity of electronic data bases . . . will lead to increased reliance on librarians as guides to what is available in machine-readable form and as exploiters of information. (p. 16)

. . . .

The growth of private information practices is likely to be very rapid in the next 20 years. This will come about, of course, with the realization that a good "reference" librarian in the electronic age does not need to operate from a library. (p. 17)

. . . .

With so many changes taking place in information delivery, education for the profession will also undergo a process of alteration. Many library schools will become schools of information science. The information science curriculum may differ considerably from the library science curriculum of today. "What goes on in a library" will no longer be the principal focus of study. The curriculum will be much broader in scope: communication processes (formal and informal) in general, publication and dissemination processes, interpersonal communication, design and management of information services, factors affecting the effectiveness and cost-effectiveness of information services, indexing, vocabulary control, data base management, information resources and how to exploit these resources effectively ("search strategy" in the broadest sense of the term), and the valuation of information services. The librarian of tomorrow will need to be thoroughly familiar with a wide range of communication activities, including electronic mail systems, computer conferencing, communications networks of all types, and word processing and text editing systems and equipment. (p. 18)

Smith, 1980:

[The] undecideable element of user needs is represented outside the information system. This is a much more realistic interpretation of what happens during information transfer and shows up the limitations of the process; it is not only a flow of information that is necessary but also a selection according to the requirements and language of an outside metasystem.

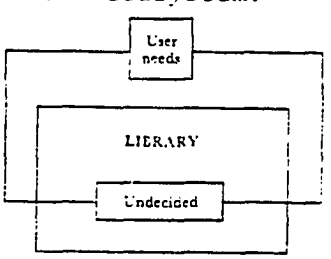


Figure 7

(p. 76)

7.4. Conjunctional Definitions about Objects and People: To process

Stevenson, 1958:

> Documentation is really the business of handling specialized information. It includes not only the organization and retrieval of such information, but its creation and distribution. The basic unit handled--at least in the technical field--is the unpublished research report. (p. 128)
>
> . . . .
>
> [I] would like next to discuss the very important question of the relationship of this business of documentation to the library profession. It might be said that an uneasy truce exists at the present time. The question is where does documentation fit in?
>
> . . . .
>
> Let me say emphatically that I do not wish to see a new profession of documentation develop. In my opinion, this would be little short of disastrous.
>
> . . . .
>
> [The] organization of information is the professional basis of librarianship. I can see no good reason why this basis cannot logically be extended to include the field of documentation--the handling of the unpublished report. (p. 131)
>
> . . . .
>
> [If] documentation becomes a separate field, such a split will further restrict the scope of the library profession, and push us further in the direction of being mere keepers of books. Think of it this way. Librarians have traditionally chosen the organization and utilization of the book, the published monograph or separate, as their primary field of endeavor. (pp. 131-132)
>
> . . . .
>
> There is no good reason why the growing field of Records Management shouldn't have been entrusted to our profession. This field is concerned with the organization and utilization of business records. It was lost to librarians simply because we were unable to extend the base of our profession to a different information area--in this case business records.
>
> . . . .
>
> We should all be working toward a synthesis of special librarianship with documentation. . . . We must not deride techniques being developed for handling the unpublished report as merely a lower grade of librarianship. Possibly the opposite is true. (p. 132)
>
> . . . .
>
> Practitioners of the new profession carefully refrain from using the term "librarian," favoring instead such terms as "information officer" or "information specialist." This is because the stereotype associated with the term "librarian" is a stumbling block to acceptance of a new conception of special librarianship and a broader type of information service.
>
> . . . .
>
> I believe the field of documentation is a natural and obvious extension of the work of the special librarian, and that a synthesis of documentation and special librarianship is both desirable and logical. (p. 133)

Hayes, 1964:

> In a very real sense, it is the concept of system design which has come to represent the revolution--it is probably teh crucial concept in the theory and application of "information science." It is my personal belief that information science will become an integral part of library education, that it will become an increasingly important part of the librarian's professional and operational responsibility, and that it represents the theoretical, if not scientific, foundation of librarianship. (p. 51)
>
> . . . .
>
> I have said that system design is the crucial concept in information science. What then is "information science"; how does it differ from "information technology" and "library science"; how does it differ from "information specialty"? As I have said, it is a theoretical discipline, one which is concerned with the application of mathematics, system design, and other theoretical concepts to formalization of the processes in handling information. It is concerned with information technology but is in no sense identical with it. . . .(pp. 51-52) However, information technology--computers, micro-recording, communication systems--has represented the catalyst and made it so important to develop now the concepts of information science. On the other hand, "library science" has become almost completely identified with a specific type of information system and is, I feel, highly oriented toward the operational particulars of existing libraries. If this view is valid, then information science is the theoretical discipline of librarianship and library science is the professional one. . . . I use the term "information specialist" to describe someone concerned with the operational utilization of a particular information system to meet the needs of the people served by it. (p. 52)

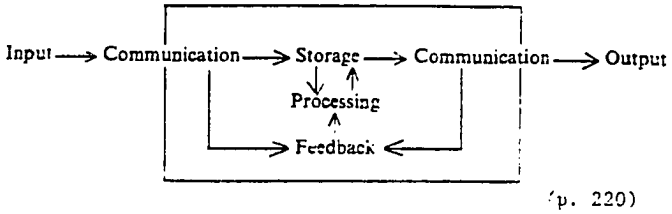
Swank, 1967:

> I do not believe that information science is a field separate from librarianship. It is rather a fresh insight into the nature of librarianship--an insight derived from broader concepts, more exact methodologies, and more varied applications. Its content cuts across the entire spectrum of librarianship and even penetrates the core curriculum. Like documentation, it is an extension of librarianship. The processes of collection building, organization, and utilization are, for example, common to all library and information systems . . . to all information-handling systems. . . .
>
> . . . .
>
> These three--recorded knowledge and its users, its intellectual organization, and the service agencies--are, I believe, comprehensive of both librarianship and information science. (p. 41)

Hayes, 1969:

> Librarianship has repeatedly been faced with such a "crisis of identity". Are libraries simply "storehouses" or are they "centers for information"? Which do librarians regard as important, the "medium" or the "message"? (p. 216)
>
> . . . .
>
> Admittedly, the historical role of the library as preserver of the records of the past is still an important one. "Information" does not exist in abstract form but only as data recorded in some record and therefore, even for those whose interest is only in the information, the record in which it is recorded must be preserved and made available. But should libraries continue to regard this as their primary function?
>
> . . . .
>
> Information science is becoming an integral part of library education, an increasingly important part of the librarian's professional and operational responsibility, and a part of the theoretical foundations of librarianship. (p. 217)
>
> . . . .
>
> Information Science is the study of information producing processes in any information system in which they may occur. However, although this indeed is the definition which we will use, it implies something which may not be true, viz. that information science can exist as a separate discipline. (p. 220)
>
> In fact, any real system can be studied only by use of the scientific methodologies appropriate to it. . . . For example, RNA and DNA . . . are information systems of vital interest to information science.
>
> . . . .
>
> [While] "information science" may in principle be concerned with pure analysis of processes, in reality it cannot be separated from the methodology of specific disciplines. It is therefore more appropriate to talk in terms of "information science in genetics", or "information science in social theory" or "information science in documentation" than to talk of "information science" in isolation from specific systems. (p. 221)
>
> . . . .
>
> An Information System is that set of aspects of a general system (a natural phenomenon, a physical construct, or a logical construct) which are identified as information producing. The usual abstract description of a system . . . [shows] information producing processes . . . grouped into the standard categories: communication for input and for output, storage, processing, and feedback.

Figure 1. Information System Schematic



(p. 220)

Koblitz, 1969:

> [Librarianship] and information/documentation are quite different activities. . . . [But] some librarians consider information-documentation only as a special type of bibliographic services, whereas some representatives of information and documentation hold the opinion that the problem of relationship between the librarianship and information/documentation has no significance and therefore do not show due interest in the solution of this problem. As to the reasons for the origination of these two viewpoints, they lie in the quite natural conservatism or pragmatism which yet impedes the process of dissociation.
>
> . . . .
>
> [The] production of information includes not only the origination of the initial (primary) information but also the results of handling the initial information (for instance, through abstracting the information sources), and the results of processing the products of information handling (for instance, in the form of preparing synthetic information media, i.e. secondary information and information of the third degree). (p. 125)
>
> . . . .
>
> By specialized information as a kind of activities should be meant a complex of purposeful actions comprising the production (including handling and processing), storage, retrieval and distribution, (including transfer and reception) of specialized information.
>
> . . . .
>
> Constituent parts of specialized information as an activity are, completely or mainly, such areas as:
> - education,
> - publishing business,
> - archival trade,
> - museology,
> - translation work,
> - journalism,
> - scientific and industrial propagation,
> - business advertising. (p. 128)
>
> . . . .
>
> [The] term "information science" is used to designate a field of science (a correlate is specialized information), and therefore this term is of a higher order with respect to the library science, the archival science, the information and documentation science, the journalistic science and to all other associated branches of science.
>
> . . . .
>
> [We] consider the term "informatics" as a quite possible linguistic alternative for "information and documentation science", . . . (p. 141)

Stevens, 1970:

> Any consideration of <u>generalized</u> research and development requirements in the computer and information sciences should obviously be based on one or more aspects of the fundametnal information processing cycle--the acquisition of information; the

processing of information to find, fix, and focus significant features present; the recording and storage of processed information for subsequent use, and the selective recall or retrieval of processed and stored information for use.

. . . .

For preliminary purposes of indicating trends and defining certain obvious research and development requirements we provide in Figure 1 a generalized function chart of information processing systems.

The intended generality of Figure 1 can be illustrated by tracing through several examples of information processing system applications. First is a case of a relatively novel source data collection, processing, recording, and response system. Another example is a representative system designed for automatic character recognition. The third case involves both conventional and non-conventional techniques for the handling of recorded scientific and technical information--the areas of traditional library science, mechanized documentation, and information selection, storage, and retrieval systems. (p. 3)

. . . .

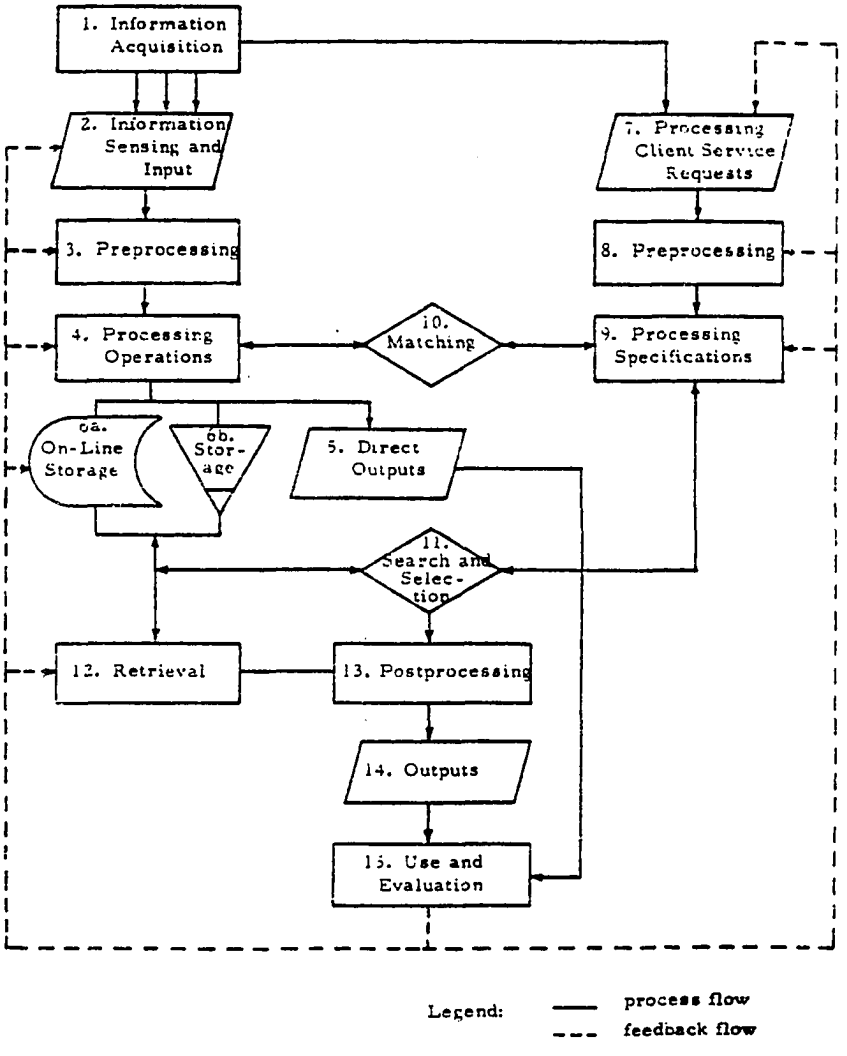


FIGURE 1. *A generalized information processing system.*

White and Macklin, 1970:

> [Because] of the growth of new specialties in the library field such as information science, and the development of programs in these areas outside the traditional library school, it seemed useful in this study to develop a prospective classification of specialties. . . . (p. 75)
>
> . . . .
>
> Our scheme of classification of specialties was designed to subsume both the traditional divisions within library schools and the newer "systems" approaches being advocated in programs of information science. It focused on three major components of any information system--the stock of information, the institutions processing this information (libraries and information centers), and the recipients of the information (the users)--and tries to classify specialties in terms of their roles either at the inter-faces between these three elements or in co-ordinating the processes related to them. Among the inter-facing roles are book selection, technical services and references, and the co-ordinating roles include various aspects of administration. (pp. 75-76)

Sviridov, 1972:

> Training of documentalists (the author uses this term as a general one to cover also information officers and other categories of information handling personnel) has always been a central point in the activities of FID [International Federation for Documentation], . . .
>
> . . . .
>
> Already in 1960 the FID Programme pointed out the need to formulate and analyse the training needs of various categories of documentalists (from information officers to special librarians], as well as to differentiate the training methods applied to those various categories of information handling personnel (p. 42)
>
> . . . .
>
> [We] must take into account new developments in all areas relating to information processing and transfer. (p. 43)

Wasserman, 1972:

> [One] tributary [of librarianship] experiences a swelling flow of traffic. This is in the area variously called information science, documentation, systems analysis, all oriented toward the rationalization of the machinery and processes of library organizations. (p. 135)
>
> . . . .
>
> The problem in essence is whether a new breed is to be fashioned, built upon the old but equipped with new skills, or the territory simply divided between traditional types who would continue to be prepared and a newer type. (p. 136)
>
> . . . .
>
> Where they [information science offerings] are more than the occasional courses in the conventional library school, the essential intellectual construct which holds the newer programs together as their integrating rationale is a view of librarianship as a discipline in transition, capable of being shifted in its fundamental

> nature from a prescientific state founded on rules of thumb and tradition to one with the characteristics of a scientific discipline. Such an argument holds that by bringing mathematics, systems analysis, operations research and analysis to bear upon its problems, logical principles which permit of the rationalization of procedure, built upon unambiguous cause-effect relationships, will emerge. Ultimately the practice of librarianship would evolve under these terms to become a type of applied engineering, with information handling as the area of application. (pp. 136-137)
>
> . . . .
>
> Still the consequence of systematization, of efficiency and economy, is not in any way a correlate of altered objectives, despite the potentially sanguine effects of such modifications. To the extent that the key questions are perceived as value-neutral, subject simply to analytical processes which accept disciplinary commitments, values, and goals as they are--to that extent the solutions will simply further rationalize the institutional processes. . . . [The] more fundamental choices remain unexposed. (pp. 137-138)

Horton, 1974:

> [Clearly,] the production, handling, and dissemination of information has come of age as a respectable industry. . . . And yet those primary disciplines concerned with improving the management of information--computer science, automation, library science, communications, and information science--have failed to intermesh theory and practice in order to harness total available information resources in the most efficient and effective ways to support users. By "information resources" I embrace the full range of producers, suppliers, handlers and distributors, and include information in all of its forms, documented and undocumented, raw data and evaluated information. And I embrace library holdings, information center holdings, data in information systems and computer data banks, office files and records, newspaper clippings, sound recordings and films, corredpondence and messages, and other information storage and handling media and forms. (p. i)
>
> . . . .
>
> [This book] reviews, step by step, how the systems approach can be successfully applied to helping an organization or an individual maximize the use of available information resources by considering the problems of storage, handling, and retrieving information in a broad context. It is a methodology, or a means of helping get at sources and types of data needed.
>
> The systems approach looks at every facet and each stage of the problem, beginning with the purposes to which information is put. Thus, problem-solving, decision-making, current awareness, and retrospective objectives are all considered, as well as other purposes. (p. ii)
>
> . . . .
>
> [Systems science] is concerned with applying two modern management concepts, systems analysis and the systems approach, to the problems of information handling. . . . [These] concepts are central to the theme of this work, . . . (p. 7)

. . . .

The information system is the fundamental tool with which we are ultimately concerned. . . . The core of such a system are steps taken to collect, process, and display information needed by the user/decision-maker. Collectively, these steps can be considered the information system. (p. 61)

Wersig, 1974:

If "information sciences" are those sciences concerned with a specific type of information processes the following components could be distinguished:
a. Kernel areas, i.e. those disciplines concerned with different types of information systems like
- "information and documentation science" (concentrating on scientific and technical information systems)
- "library science" (concentrating on libraries as elements of information systems)
- mass communication research (concentrating on public information processes)
- "archival science" (concentrating on archives as elements of information systems)

Whether all these disciplines are distinct, may be defined in other ways, or may be amended by others is not important for the moment, because the further work in the whole area will show this more clearly than individual definitions could.
b. diffusion areas, i.e. those disciplines concerned with single components of information processes, usually newly developing sub-disciplines of existing disciplines like
- psychology of information (concentrating on psychological prerequisites of information processes)
- sociology of information (concentrating on social implications of information processes and systems)
- economy of information
- information politics
- information technology

Those "information sciences" are supplemented by
c. sciences with basic functions like
- semiotics
- cybernetics
- general systems theory
- general communication theory (p. 172)
- philosophy
- science of science (p. 173)

Daniel and Mills, 1975:

The scope of library and information science is taken to be the totality of problems involved in assembling, or otherwise bringing into a system information-carrying media and processing these for dissemination and retrieval.

As with any rapidly developing and cross-disciplinary field, acceptable definition is not easy. In particular, 'information science' is a typically ambiguous construction. We take it to stand for the systematic and scientific study of the problems of information dissemination and retrieval. (section 2, "Introduction")

Wersig and Seeger, 1975:

> An "information system" then may be understood as a "system which objectives are to organize communication processes, particularly between human beings, in order to effect optimal information". (pp. 8-9)
> . . . .
> The objectives direct these [system] operations to fulfil the information needs of the clientele of the system thus enabling the system to transform incoming messages from various sources into output messages being highly capacitated to fulfil the information needs of the clientele.
> . . . .
> The heart of the system (but not the system itself) is the "transformation function". . . . (p. 9)
> . . . .
> Perhaps the most important trend is that the traditional domain of information and documentation--science and technology (including social science and humanities)--is becoming more and more interrelated with other fields of societal life so that remaining only in this field is impossible.
> . . . .
> By doing so the field of "users" is broadened in a drastic way. We have to face the situation that the whole field of information systems in administration, medicine (including hospital information systems), politics, mass communication, education, jurisdiction, military, even perhaps of commerce (banks, air lines etc.) will have to be considered in the next time in close connection with scientific and technological information, if not all these systems have to be seen as an integrated part of the field. (p. 16)
> . . . .
> In the traditional field of information and documentation three areas of specialisation (with some sub-areas) were distinguished:
> a. documentation (information services, where some specialized areas already are indicated). . . . (p. 26)
> b. librarianship, where some specialized areas already are existing, . . .
> c. archives, where some specialised areas are indicated, . . .
> . . . .
> In general, it could be predicted that the classical fields of literature documentation and librarianship will come closer together, whereas the field of data documentation and other new information systems will form a new sub-field. (p. 27)
> . . . .
> Here it can be expected that information science may act as a common roof for the whole field and therefore all sub-fields have to be included in this survey. (p. 28)
> . . . .

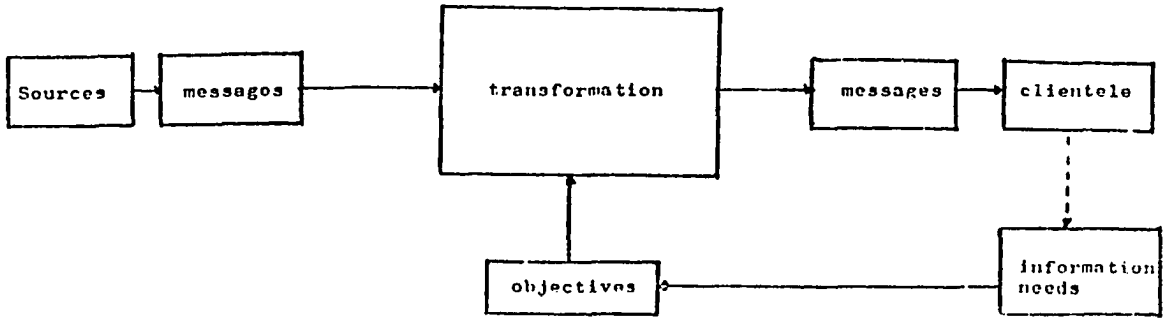


Table 2: Scheme of the information system (p. 8b)

7.5. Conjunctional Definitions about Objects and People: To counsel

Belzer and Brown, 1973:

> [A] major conclusion is that, until the whole field of library and information science is redefined in terms of future information needs and the probable shape of future information service institutions and until related professional educational responsibilities are restructured to cover the resulting spectrum of personal competencies required, the most important [curricular] changes may not be made. (p. 12)
>
> . . . .
>
> "Guess-timates" drawn from recent articles and reports appearing in professional journals . . . do not preclude the possibility that most Americans will be 1985 have cause to rely upon new types of local or regional communication service agencies or information counseling centers as their primary means of gaining access to the world's store of recorded knowledge. Admittedly, an entirely fictional concept, which does, however, represent in physical terms the kind of organization which will be needed, the "information center" idea suggests a development at the community level of something more than a typcal large public library system (although less than a "people's university") having elements of an up-to-date branch bank, a chain department store, and a social welfare counseling service located somewhere within the structure. (p. 15)
>
> . . . .
>
> [Professional competencies needed by library and information service personnel are:]
>
> a. Abilities to conceive, plan, establish, manage (and supervise) the continuing successful operation of information program(s) needed to serve given classes of users. (p. 24)
>
> . . . .
>
> b. Abilities to consult with a given class of users; diagnose specific needs; locate, retrieve and provide relevant information in formats and amounts needed and (as appropriate) assist in the utilization of information provided. (pp. 24-25)
>
> . . . .
>
> c. Abilities to acquire, organize, analyze, describe and process information and materials in relation to development of collections (or of providing access to collections). (p. 25)

Penland, 1974:

> An integrated communications profession exists based on the infrastructure specializations of media, library, and information science. . . .
>
> The rhetoric of media, library, and information science leads one to believe that the verbalized social objectives of the field could be summarized in a very few explicit statements. The profession seems to have something to do with citizens as they go about their interpersonal and community relations. Apparently by the effective use of resources, people can be induced and prepared to lead more productive lives. It appears that the professional staff member does not entirely react to demand, but is at least supposed to try to motivate people to use resources in an increasingly more mature manner. (p. 4)
>
> . . . .
>
> The essential function of all communications leaders such as librarians and politicians is to help the citizenry to articulate felt concerns and interests and then to follow up in an heuristic way towards their realization. Society has delegated that part of this responsibility to the communicative profession based on information, library, and media science--a specialization that includes materials design and production. (p. 8)
>
> . . . .
>
> Involvement in free-form projects is an essential developmental task in the healthy growth of the patron whether as an individual, a group, or a community. Communicators in the profession based on information, library, and media science provide such experiences through their roles of counselor, group-sensitivity trainer, and community worker. Fortunately these roles are grounded in a sound preparation in media communication in order to service the patron who is a developing adaptive control organism; . . . Within the context of method, the communicator facilitates learning (both affective and cognitive) by establishing a relationship between materials production and the patron. (p. 10)
>
> . . . .
>
> Some consideration should be given to communication as a cybernetic system in order to overcome the limitations imposed upon a communicative profession by such infrastructure priorities as document organization and transfer, and the logical strategies of data retrieval. A system that includes human concerns and interests will shift emphasis onto interpersonal communication as a framework within which purposes, policies, and even procedures can be developed. (pp. 11-12)
>
> . . . .
>
> The profession based on media, library, and information science goes beyond a helping role and involves its patrons in actually mediating their own applications of the surprise value of information. (p. 147)
>
> . . . .
>
> The professions, and in particular librarianship, are designed to help citizens reduce the time lag between the creation of new knowledge and its application in social policy. (p. 159)

. . . .

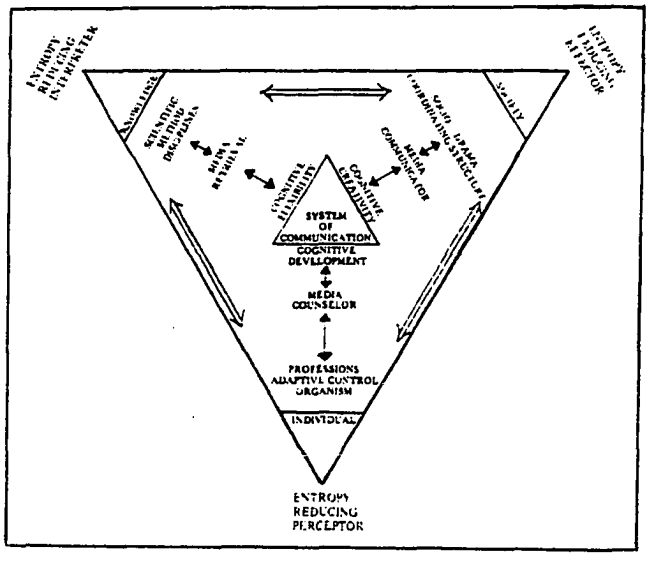


Figure 1. Generalized Communication Model

(p. 12)

7.6. Conjunctional Definitions about Objects and People: To link

Shera, 1951:

> The essential task of documentation, then, may be described as the matching of two patterns: (a) the pattern of all scholarly activities in which the use of primary graphic records plays a part, and (b) the pattern of intermediary services which transmit primary recorded materials from the scholar-as-producer to the scholar-as-user. By contrast, bibliographic organization is concerned with the channeling of graphic records to all users, for all purposes, and at all levels in such a way as to maximize the social utilization of recorded human experience. (p. 2)
>
> . . . .
>
> In summary, then, one may say that documentation is that portion of bibliographic organization that is involved with the indirect communication of primary materials within and among groups of specialists, to the end that they will receive, in a manner as efficient as possible, the data which they require for the effective execution of their work. (p. 3)
>
> . . . .
>
> In conclusion, documentation lies at the very heart of librarianship, and the primary responsibility of the librarian is to make of himself an expert in bibliograhic organization. (p. 19)

Shera, 1956a:

> Librarianship is concerned with the universal task of channeling all kinds of graphic records to all users, for all purposes, at all levels, to the end that all recorded human experience may be as

socially useful as possible. By contrast, documentation is that aspect of librarianship concerned with improving graphic communication within and among groups of specialists; it is limited to that portion of librarianship which treats of the materials and needs of scholarship, and hence it is concerned with the scholarly apparatus of bibliographies, indexes, and abstracting services.

In general, then, one may say that the science of documentation treats of the collecting, organizing, and servicing of graphic records. . . .

. . . .

But documentation has developed as it has largely because of the current demand for high-speed access to precise information. . . . Many of the traditional library practices are not geared to the pressures of these demands, and documentalists must constantly search for new methods and procedures that are as efficient as they can be made to be. Documentation, then, is not only that aspect of librarianship which deals with scholarly materials, it is librarianship under pressure--it is librarianship in a high key.

In this ceaseless search for efficiency in the documentation process, machines offer some hope; therefore, the use of machine searching for bibliographic reference work has been widely associated with documentation. But the problems that confront the documentalist-librarian are not to be solved by gadgets alone, nor will automation be the only answer.

. . . .

One might go so far as to say that research in documentation is directed toward improving the efficiency of librarianship so that it can accommodate itself to the demands imposed by the tempo of a highly competitive society. (p. 103)

Fairthorne, 1961:

The whole aim of documentary classification is to delegate as far as possible the making of distinctions between texts from those who know the subject matter, to those who know only the wording of the texts and the wording of specifications.

. . . .

The example of the single-book library shows that the specifications of requirements are items to be distinguished and searched as well as the documents themselves. In general, we have two sets of physical messages, with pre-asserted relevances, that must be brought into correspondence. Each of these entails its own problems of identification and search. (p. 427)

. . . .

The only closed documentary systems are those that are neither added to nor used. In practice all useful collections of records must acquire new items, must adapt to new points of view and must interpret differently established specifications and document groupings. Without continual monitoring and revision, any documentary system will fall into chaos or be smothered in a growing cocoon of arbitrary rules devised to cope with particular difficulties as they arise. The problem of revision ranks with the problems of delegation and of relevance

> as the deepest difficulties of information retrieval. Without reasonable, if partial, solutions to these, rapid and efficient methods for document search and presentation are almost valueless. The latter are, of course, problems wholely within the domain of data processing. (p. 428)
>
> . . . .
>
> [A documentary classification] does not classify 'knowledge', or even 'the existing state of knowledge', but it groups such aspects of the contents of existing documents that are usefully distinguished to cope with current demands. In application, growth of the collection and emergence and decay of topics are dealt with as a succession of closed systems, each resembling the last and each with rules resembling the last set.
>
> . . . .
>
> Classificatory activities do not, in fact, develop outside the library or 'black box', though obviously they are remotely dependent on the same outside motivations that compel people to write or even read. As shown above, they are not rules in the algorithmic sense, but descriptions of the current way people write books and the current way people use them. They are not laid down for users to protect themselves against librarians nor, as many believe, for librarians to protect themselves against users. They are made in self-defence by the library staff to protect themselves against the documents.
>
> For, so far as it affects the work of the prisoners within the black box (their opinons on the work do not affect the prison system) the world they observe and manipulate is the world of texts; that is, the texts of documents and the texts of requests. Their basic drive is to increase the flow of documents and requests while keeping down the costs of doing so and of not doing so.
>
> . . . .
>
> To survive the conflicting directives for increasing flow and decreasing cost, the prisoners must match documents and requests in the way we call documentary classification. The form it takes depends on the texts (considered as sets of marks) alone, not on outside interpretations of them; and on the way they occur as documents or requests, not on explanations of why they occur. (p. 429)

Hattery, 1962:

> [It] is possible to develop an orderly approach to science communication in any given situation . . . based on the concept of science communications, as a system in which information is produced by $Researcher_1$ and transmitted to $Researcher_2$.
>
> The next step is the production of information from $Researcher_2$, which may be transmitted to $Researcher_1$, among others, thus closing the loop.
>
> . . . .
>
> Complexity is added to this scheme when all researchers are substituted for $Researcher_1$ and $Researcher_2$. Not only are numbers added, but communication must pass barriers of distance, discipline, proprietary interests, patent rights, language and political boundaries. Each of these and other barriers is a matter of concern in the study of science communication. (p. 10)

. . . .

[The scientist] must depend heavily on intermediary repositories where information can be stored and later retrieved through classification and index systems. The nature and role of the repository varies according to needs of the person served, nature of the information handled, media, available means and other factors. (See Exhibit 5.)

. . . .

It is a short step to recognition that the science information problem requires the joint contribution of professional knowledge, understanding and skills of the scientist, the systems analyst, the librarian, and the information or data processing specialist. This combination forms the basis for defining a new professional field of science information (or documentation). (p. 14)

. . . .

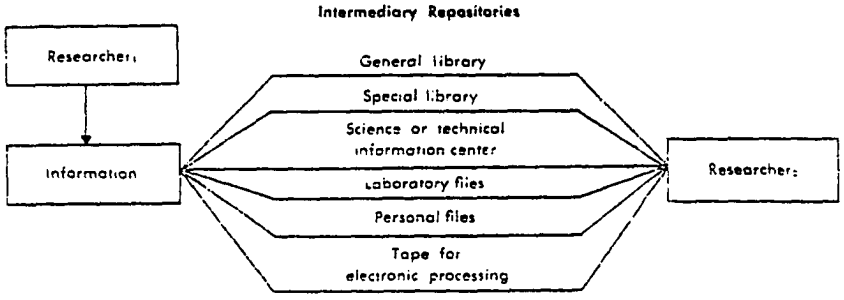


EXHIBIT 5 (p. 13)

Shera, 1962:

The use of the term system . . . is particularly important, for the reference librarian, seeking to improve his services, must consider the total complex of processes by which recorded knowledge is generated, reproduced, retrieved, and disseminated. It is the reference librarian who is the mediator between the book and its user, and he will do his job badly if the system upon which he depends does not take into account the entire cycle by which the printed word progresses from its original graphic form to its ultimate destination in the hands of the user who needs it. Thus, to paraphrase S.R. Ranganathan, we must keep up with the world of graphic records so that every book can have its reader and every reader his book. (p. 73)

Shera, 1964:

I shall not try to define a librarian too precisely. I think we all know pretty well what a good librarian is supposed to do. He is the mediator between the human being and the graphic records of society (Kenneth Boulding calls these records the "transcript of the culture") for any socially beneficial purpose. . . . Whether the people who perform this act of mediation are called librarians or information specialists or documentalists, does not alter the essential character of what they do. They are all mediators between books and people, and, so far as I am concerned, they are all librarians.

. . . .
If a science librarian is not a science information specialist I do not know what he is, . . . (p. 2)
. . . .
[Whatever] the discipline of information science is, it is librarian-based. The librarians are the ones who, over the centuries, have performed this function of mediating between man and his recorded knowledge. It is they who are concerned with the preservation, communication and utilization of the transcript of the culture. (p. 5)

Heilprin, 1965:

If the librarian (or more generally, the information scientist) is actually an important service link in optimizing the use of graphic recorded information, then success depends on how much of this process he understands. He must see it all in profile--how we manufacture knowledge, starting with direct sense impressions and including (in science, at least) careful comparison of communicated abstractions. Publication in symbols usually follows. Often all of this happens before the librarian sees the product. But with increasing frequency he must take part in the manufacturing process by supplying some of the communicated concepts in various pretested states, with evaluations of these states. This requires expertise on subjects, not merely references. He also will tend to be more of a scientist, and in particular will have to understand the way in which what once has been accepted as objective tends with the advance of knowledge to slip back into its prior state of subjectivity. If epistemology encompasses this entire field, including all of communication science, clearly a large expansion is needed in the background of the information scientist. He must at least be aware of the entire process of knowledge, and of the principal constraints on and weak points in its communication. . . . We may conclude that perhaps the main reason why information science has progressed such a short distance as a science is that we do not understand the connections we are groping for. Lack of knowledge of epistemology is possibly the greatest barrier to improving library and information science. (p. 35)

Mathews, 1974:

Our society is presently faced with a serious gap in every field of endeavor, between available knowledge and its application. People are essential to the process of bridging this gap, and librarians and all library and information science personnel are the people charged with the responsibility of connecting people to the knowledge they need. (p. x)

Mooers, 1974:

One might say that Notification, in the field of library science, is concerned with all aspects of the task of bringing authors' messages to the attention of the ultimate readers, together with the physical, conceptual, and logistic problems inherent in this service task. (p. 184)

Elman, 1976:

> [The] principal "raison d'etre" for both information scientists and librarians is to bring together the information seeker (the human element) and the information sought.
> . . . .
> Librarians and information scientists are among the key members of the fastest growing group of the nation's work force--the group Drucker [1975] calls "knowledge workers." (p. 425)

Hookway, 1976:

> [Once] we move away from concern for the totality of information, intermediaries and innovators are needed, ... There is an additional problem too: if the information we require has been selected and evluated by an intermediary it must be credible as well as edible.
> . . . .
> [These] intermediaries should be extraordinarly powerful people: they can control the information flow: they are custodians, interpreters and animateurs; they hold under their control the wisdom of the past, the knowledge of the present, and our extrapolations for the future.
> . . . .
> [They] form part of a single profession concerned with information transfer; . . . .
> . . . .
> [The] profession is fragmented, with many institutes, associations and so forth representing its interests, despite the essential unity of the problems and the solutions required, whether we are dealing with airline reservations, scientific information or library problems.
> . . . .
> [The] lack of a unified professional image leads to a lack of appreciation of what information workers can do for the organization by which they are employed. . . .
> I believe that our profession, for the future, should be grouped about, though not confined exclusively, to what we now consider to be the province of information and library science and their technologies. . . . I stress the need for us to maintain the credibility of the information which we provide for one especial reason--we shall have, I am sure, an increasing part of play in the provision of information services to the individual citizen. (p. 1)

Shera, 1976:

> [The] individual librarian, standing as mediator between the user and the graphic records he needs will always be central to the library's operations. (p. 40)

Wilkin, 1977:

> The term "information broker" was suggested . . . [to] help to emphasize that the role depended on a two-way interaction between the [health service] planners and their information specialist. The information broker is now just one of many information posts which are being established by community and health service planners in Great Britain.
>
> . . . .
>
> The information broker is regarded as the planners' professional equal and is expected to support not only their information needs by providing them with a mixture of general communication and information services, but also to take responsibility for some of the normal planning assignments. (p. 283)
>
> . . . .
>
> The planners had hoped that the information broker would be able to anticipate their needs and provide them with information which could be easily and immediately incorporated into a specific stage of their decision-making processes. For a number of reasons, which seem obvious in the abstract but are not so in the working situation, this proved to be more difficult than they had imagined.
>
> . . . .
>
> Another difficulty arose when the planning process moved from the initial and general overview stage to subsequent stages where detailed information was required. Here decision-making and information-analyzing activities became closely intertwined, because only the planners' detailed knowledge of the planning assignment allowed meaingful interpretation of the relevant information. Consequently, it was not always possible, or even desirable, to separate the two processes.
>
> The important and number of personal sources of information also limited the effectiveness of the information broker in the early stages. (p. 284)
>
> . . . .
>
> It is still debatable whether it was necessary or useful for the information broker to combine a planning and an information role. (p. 286)

Horton, 1979a:

> One of the most exciting opportunities for the modern information manager has come in an area which some have come to call the "information broker." In story after story in the news media and in the professional literature have come tales in the last decade of one entrepreneur after another who has sold innovative information products and services for a handy profit. . . . These information brokers have ingeniously sorted the information wheat from the data chaff.
>
> . . . .
>
> Interestingly, the service doesn't give advice and counsel--just information!
>
> . . . .
>
> The key is sifting, sorting, reaggregating, and rearranging existing data into arrays, data sets, formats and presentations which are

simple, straightforward, easy to use and useful. The information brokers readily acknowledge that they have been able to carve out a market niche precisely because the gigantic data producers have traditionally produced, pbulished and disseminated too much information in forms and formats which are arcane and useful only to narrow bands of highly technical, specialized users. (p. 250)

Tell, 1978:

The modern librarian, documentalist or information officer acts as the "gate-keeper" of information, the mediator or indispensable intermediary between the information user and the knowledge banks, bibliographical or non-bibliographical. (p. 464)

Consequently, the information function, the capacity to obtain, process and use information, is of utmost importance for any country. (p. 465)

Horton, 1979:

. . . .

[Not] only must the Information Manager see to the provisioning of needed information, and to the filling of unmet needs which may exist, but also to the elimination or reduction of unnecessary information activities, information flows and information holdings. . . . Such continuous monitoring of obsolete, useless or ineffective information applies to all data media or forms, including, for example, single monographs or a family of periodicals or serials, a major on-line information retrieval system, a major data bank or data base, a statistical demographic survey, an interagency report, a records retention schedule, a new or revised Standard or Optional Form, a microfiche collection, and so forth.

A primary responsibility of the Information Manager is to serve as the principal advisor to top and middle management levels in providing technical expertise and counsel on such matters as information plans, information budgets, information security measures, reliability of information sources, cost effective information products and services, acquiring and introducing new information technologies, and the development and use of a comprehensive information management system for the organization.

. . . .

The Information Manager . . . is a kind of broker or counselor who must act as a bridge between increasingly costly, complex and diversified information technologies on the one hand, and larger and larger numbers of managers and users unfamiliar with the technologies, their applications, their costs and their values. . . . [The] Information Manager acts in a custodial or fiduciary role to husband, enhance and conserve information resources to help the organization achieve its lawful goals and objectives. (p. 36)

Lewis, 1980:

By this term [information brokerage] I mean the search for and sale of information, on request, as an agreed commerical transaction. (p. 71)

. . . .

The opportunities in information brokerage must grow, but I perceive that the need will then diminish as the universaility of systems opens up the whole of organised knowledge to the simpler user. However in the interim period (1980-1995?) the information broker will come of age and this could well develop into a higly profitable sphere of commerical activity for today's young information professional.

. . . .

Study the organisation changes and trends. In particular note the convergence of the following functions:

Information and library,
Registry,
Administration and 'Office Services,'
Planning,
Commercial intelligence,
Telecommunications,
Management services. (p. 72)

Shera, 1980:

[A] library in the sense one is concerned with here is an organization, a system design to preserve and facilitate the use of graphic records. It is a social instrument created to form a link in the communication system that is essential to any society or culture. . . . The library may from time to time assume certain marginal functions, but its basic purpose remains generically the same--a link in the communication chain that is concerned with the custody of recorded knowledge. (p. 315)

7.7. Conjunctional Definitions about Objects and People: To create and transfer

Shera, 1952:

Though both special librarianship, in practice, respond to a wide variety of dissimilar demands, they find a common basic unity in their objective--to facilitate the flow of recorded information to appropriate segments of a complete culture.

The similarities in special librarianship and documentation may be emphasized by a discussion of the operational characteristics of documentation and their application to the work of the special library as well as to the documentation center. Documentation is generally considered to comprise four major activities: acquisition, organization, dissemination, and preparation and publication. (p. 195)

Taube, 1953:

> Documentation, as the designation of the total complex of activities involved in the communication of the specialized information contained in this new form of literature [of scientific and technical reports], includes the activities which constitute special librarianship plus the prior activities of preparing and reproducing materials and the subsequent activity of distribution. In essence documentation is an amalgam of librarianship and publishing with the added responsibility of preparing or causing to be prepared the materials to be published, collected, organized, serviced, and disseminated. (p. 7)
>
> . . . .
>
> In essence, the material produced by documentation activities corresponds to the old vertical file material that wasn't worth the type of organization usually accorded to books and periodicals. But the growth of this documentary or report material converted a peripheral concern to a central activity.
>
> . . . .
>
> The word "documentation" has been chosen as the name of this new synthesis by a natural extension of its established meanings. The dictionary tells us that a document is a work containing official information and, by extension, any writing or book which contains information is termed a document to distinguish it from a work which is intended to entertain. (p. 9)

Evans and Farradane, 1958:

> The function of a scientific information officer is basically different from that of a librarian. Documentation has been defined as the recording, organization, and dissemination of knowledge; the information officer is deeply concerned with all three. The information officer has a critical function: his task is synthesis of information, its predigestion and the addition of background information.
>
> . . . .
>
> Documentation has been defined as the recording, organization, and dissemination of knowledge. The librarian is mainly concerned with organization; the information officer is deeply concerned with all three. (p. 1489)
>
> . . . .
>
> [The information officer] is responsible for ensuring that the work of the research staff is properly recorded and published, so that its use is maximised; that is to say, ensuring that it is systematically and adequately reported to facilitate accessibility of the information both currently and in future; and also that it be fed into the world pool of information, where possible, so that it may reach other centres with the greatest certainty. He is in effect a publisher with a specialist responsibility. (p. 1490)

Becker and Hayes, 1963:

> Several groups of people, recognizing the need for new and different techniques for organization of information and equipment, have devoted themselves to research into the problems of information system design. Since they are interested in finding new ways by which specialized information can be organized and used, they tend to view information systems in a broader sense than traditional librarianship by including the entire process from original publication of material to its ultimate dissemination from the information system. With such a broad scope of interest, this field of study has become a rather amorphous one. Since librarianship is closely related to it, there is no sharp dividing line between the traditional librarian and those, called the documentalists, concerned with this kind of research. Similarly, there is no sharp dividing line between the standard data processing system designer and the system designer concerned with information storage and retrieval.
>
> In fact, a great deal of confusion has existed as to just what constitutes the defining characteristics of this field of effort. (p. 43)
>
> . . . .
>
> [Documentalists'] concern is rarely with the problems of operating libraries or even technical information centers. Instead it is concerned with the analysis of information systems and the development of techniques for new systems. Thus documentalists seem to share the common purpose of creating new tools which can be meaningfully applied to the mass information problems of our times. The fact that such system design tends to be concerned with the entire range of information handling, from its initial creation to its final dissemination, is characteristic of the systems approach to any problem. The significant thing is that documentation is <u>not</u> best differentiated from normal library service by this concern with the complete cycle; rather, it is best differentiated from normal library service by the fact that it is primarily concerned with system analysis and design rather than system operation. (p. 44)
>
> . . . .
>
> [Present] "documentation centers" are in no essential respect different from any library--they partake of the same operating problems. (p. 45)

Doyle, 1975:

> [Documentalists'] concern is rarely with the problems of operating libraries or even technical information centers. Instead it is concerned with the analysis of information systems and the development of techniques for new systems. Thus, documentalists seem to share the common purpose of creating new tools which can be meaningfully applied to the mass information problems of our times. The fact that such system design tends to be concerned with the entire range of information handling, from its initial creation to its final dissemination, is characteristic of the systems approach to any problem. The significant thing is that documentation is <u>not</u> best differentiated from normal library service by this concern with the complete cycle; rather, it is best differentiated from normal library service by the fact that it is primarily concerned with system analysis and design rather than system operation. (pp. 171-172)

. . . .

[Many] documentation centers are in no essential respect different from any library--they partake of the same operating problems.

. . . .

[The] beginnings of documentation in the 1930s and the recent, more spectacular onset of information science is correlated with the numbers (and percentages) of all information specialists whose activities must be concerned with new methods, new systems, and new information realities rather than with routine management of a given information facility, i.e., people whose activities must be connected with change. (p. 172)

Porat, 1977:

We began this study with two major goals in mind: to define and measure an "information activity" in the U.S. economy; and to examine the structure of the information activity with respect to the rest of the economy. (p. 1)

. . . .

The information activity includes all the resources consumed in producing, processing and distributing information goods and services.

To organize data into information, one needs to superimpose order: a system of logic, a system of thought, a system of measurement, a system of communication. To communicate these organized data, one requires three elements: a communicator, a channel of communication, and a receiver. The operational definition of information used in this study goes beyond the narrow definition offered above, encompassing all the workers, machinery, goods and services that are employed in processing, manipulating or transmitting information. The telephone, the computer, the printing press, the calculator, the manager, the secretary and the programmer--these are all essential members of the information activity. It would be almost impossible to handle information without resorting to these resources. (p. 2)

. . . .

Which occupations are primarily engaged in the production, processing, or distribution of information as the output, and which occupations perform information processing tasks as activities ancillary to the primary function? To make the question clear, is there a qualitative difference on the issue of information between a computer programmer and a carpenter? (p. 105)

. . . .

I have developed a conceptual scheme for classifying information workers, . . . into three major classes.

The first, "Market for Information," includes those workers whose output or primary activity is an information product. Information is produced and sold as output and often assumes the form of a knowledge commodity.

The second major class of workers provides "Information in Markets." Their output is not knowledge for sale, but rather they serve as information gatherers and disseminators. These workers move information within firms and within markets--they search, coordinate, plan, and process market information.

The last class is the "Information Infrastructure" workers, whose occupations involve operating the information machines and technologies to support the previous two activities.

. . . .

> Knowledge producers . . . fall into two classes of workers--scientific and technical, and producers of private information services. (p. 106)
>
> . . . .
>
> The second class of knowledge workers produce a wide variety of "private information services." This class includes lawyers, architects, computer programmers, and accountants [among others].
>
> . . . .
>
> Knowledge distributors fall into three occupational classes: (i) educators, (ii) public information disseminators, and (iii) communication workers.
>
> . . . .
>
> "Educators," as opposed to the scientific community, are mainly considered as providing public distribution of already produced knowledge.
>
> . . . .
>
> "Public information disseminators" include librarians and archivists. (p. 109)
>
> . . . .
>
> "Communication workers" include a number of occupations in the established news and entertainment media--newspapers, magazines, radio, film, and television. Although journalists engage in knowledge producing activities, such as investigative or analytic reporting, their instrument is a distributive medium. (p. 111)

King, 1979:

> [Information professionals] prepare information, analyze it for others, process it, reproduce it, and distribute it. Other information professionals are educating and training new information workers. Finally, thousands of professionals are working in information research--for example, information scientists, communication scientists, computer scientists, and library scientists. (p. 25)
>
> . . . .

Information Functions and Some Information Professionals Who Perform Them

Data or Information Preparation
Author/Writer
Science/Technical/Other Editors
Technical Editor/Writer
Publisher
Abstractor/Indexer/Cataloger

Data & Information Analysis
Information Counselor
Operations Analyst
Research Assistant
Subject Specialist

Data & Information Searching
On-line Searcher
Reference Librarian
Referral Specialist
Technical Information Specialist

Information Systems Analysis
Systems Analyst
Operations Researcher
Computer Systems Analyst
Information Scientist

Information Systems Design
Systems Designer
Operations Designer
Information Scientist
Methods Analyst

Operational Information Functions
Librarian/Archivist
Publisher
Audiovisual Specialist
Computer Specialist

Information Manager
Library Director
Director of Publishing
Comptroller
Data Base Manager

Education or Training of Information Workers
Library Faculty
Information Science Faculty
Word Processing Lecturer
On-line Search Trainer

Information Research
Information Scientist
Computer Scientist
Communication Scientist
Library Scientist

(p. 26)

Tague, 1979:

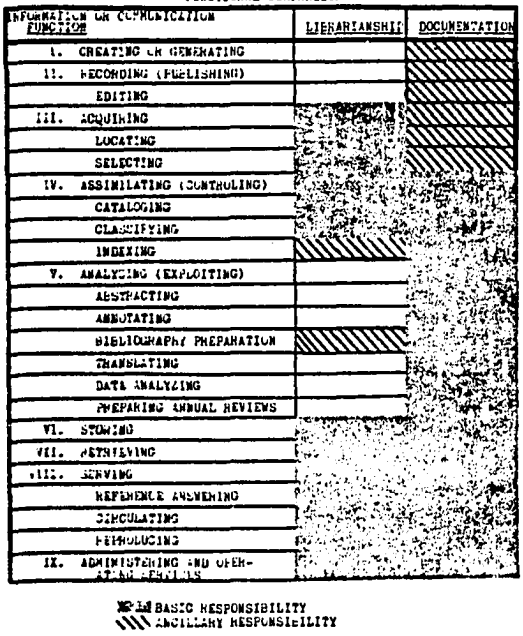
> Information science has been described as the science which deals with the generation and transformation of information--writing, publication, storage, organization, transmission, retrieval, evaluation. Unfortunately, such a definition avoids the thorny problem of defining 'information' itself. (p. 89)

7.8. Conjunctional Definitions about Objects and People: To create and use

Mohrhardt, 1964:

> The three pioneer librarian-documentalists, Ralph Shaw, Jesse Shera and Mortimer Taube, agree that documentation differs from librarianship in two aspects. It performs library-type functions in greater intensity with evaluation that requires specialized subject knowledge. Shera adds that it is the intensive bibliographic work which he feels distinguishes the activities of documentatlists. Taube stressed the impact of technical report literature as a driving force for documentation. Shaw accepts all of these elements and adds that documentation is concerned with a complete cycle of information activities expanding and rounding out the segments selected by librarianship. Both the relationships and differences can be shown best in graphic form. Table III . . . compares the various functional elements relating to librarianship and documentation and shows the activities carried out by documentalists that are not considered to be a primary concern of librarians. (p. 747)
> . . . .

LIBRARIANSHIP AND DOCUMENTATION FUNCTIONAL COMPARISON — TABLE III



(p. 747)

Licklider, 1965:

> We need to substitute for the book a device that will make it easy to transmit information without transporting material, and that will not only present information to people but also process it for them, following procedures they specify, apply, monitor, and, if necessary, revise and reapply. To provide those services, a meld of library and computer is evidently required.
>
> Let us return now to the problem of schemata from which to construct future systems to facilitate man's interaction with transformable information. As a shorter term for such systems, let us use "procognitive systems." (p. 6)
>
> . . . .
>
> The systems in which we are interested are broader than present-day libraries; the systems will extend farther into the process of generating, organizing, and using knowledge. Moreover, since the idea of "book" is not likely to be central, it seems best to substitute another word for "library". Since the systems are intended to promote the advancement and application of knowledge, they are "for knowledge," and thus procognitive systems. When this term is used in the plural, it refers to specialized systems as well as to the general, neolibrary system, and sometimes to successive generations of such systems. (footnote, p. 6)
>
> . . . .
>
> Broadly speaking, the aims of procognitive systems are to promote and facilitate the acquisition, organization, and use of knowledge.
>
> . . . .
>
> The acquisition of knowledge--the initial apprehension of increments to the fund of knowledge--involves the recording and representation of events. It involves also a selective activity, directed from within the existing body of knowledge, and analyzing and organizing activities relating the increment to the existing body of knowledge. (p. 21)
>
> . . . .
>
> [The] procognitive system will be better protected than the present system is against the introduction of false information, because of its more elaborate editing, correlating, and organizing procedures. (footnote, p. 32)
>
> . . . .
>
> Among the disciplines relevant to the development of procognitive systems are (1) the library sciences, including the part of information storage and retrieval associated with the field of documentation, (2) the computer sciences, including both hardware and software aspects and the part of information storage and retrieval associated with computing, (3) the system sciences, which deal with the whole spectrum of problems involved in the design and development of systems, and (4) the behavioral and social sciences, parts of which are somewhat (and should be more) concerned with how people obtain and use information and knowledge. (p. 60)
>
> . . . .
>
> [The] fundamental purpose . . . [of the procognitive system is] to improve the usefulness and to promote the use of the body of knowledge . . . through intimate interaction among men, computers, and the body of knowledge. (p. 90)

Kitagawa, 1968:

> Information science aims at being a unified scientific approach integrating various phenomena connected with information; that is, production of information, transmission of information, transformation of information, storage of information, deduction of information, pattern recognition due to information, retrieval of information, various operational uses of information, and so on. These information phenomena can be found in biological existence, social lives of human beings, as well as in machines manufactured by human beings. (pp. 10-11)
>
> . . . .
>
> [It] may be almost impossible to overestimate the tremendous and far-reaching effects of information science in the coming ten years on social and biological sciences. On the other hand, it is frankly admitted that the social and biological sciences that are currently somewhat less developed are so because of the lack of development of information science in these areas, in spite of the evident facts that information plays the crucial role in their formulations. (p. 11)
>
> . . . .
>
> Human societies cannot continue to keep their various activities in sound condition without adequate systems of information. For instance, we can mention here production control, inventory control, economic planning, and so on. Among these information systems there can be found a set of fundamental information systems such that any information system is a composition of some of these fundamental ones. In the present state of our social and academic activities we can mention the following set of fundamental information systems: (i) statistical data processing, (ii) computation systems, (iii) documentation systems, and (iv) information control systems. (pp. 14-15)
>
> . . . .
>
> [A] few remarks should be given here regarding library and documentation science which, we assert to be a subdivision of information science as we have defined it above. (pp. 30-31)
>
> . . . .
>
> The systems analysis of library activity is one of the most important topics to be investigated within the general framework of information systems; . . . At the same time, the science will provide us with many interesting problems in practical information retrieval and mechanical translations, . . . We may remark that library and documentation activities are now so prevalent in human activity that they are suitable subjects for statistical investigation and surveys which are easily designed and performed. (p. 31)
>
> . . . .
>
> The scope and role of information science as we describe it may be said to be almost identical with those which the Russian scientists call "kibernetiki" (cybernetics). (p. 65)

Sharr, 1970:

> Librarianship is concerned with the interaction of people and ideas. (p. 2)
>
> . . . .
>
> Just as the term "automobile engineering is applied to the various disciplines involved in the theory, design and production of motor cars, so the term "information science" is applied to the various disciplines concerned with the production, organization, dissemination and assimilation of information. (p. 4)
>
> . . . .
>
> The human being is the primary constituent of any information system. Therefore information science is a branch of the humanities.
>
> . . . .
>
> These definitions [of information science] are quite revolutionary viewed from the standpoint of traditional librarianship because they extend the concern of the information scientist, and thence by derivation of the librarian, at the one end into the processes involved in the origination of information and at the other into the interpretation and assimilation of information into the human mind. . . . These definitions liberate us from concentration on the book and the techniques of handling it; they allow us to extend our concern to the information itself from the author's mind through the librarian's mind as he organizes and retrieves, to the user's mind. We stop being merchandisers or middlemen and become creative. This is the major breakthrough. (p. 5)
>
> . . . .
>
> I have always believed that librarians should be concerned not with books but with the benefits which information can bring to people, and the means by which it does so, just as a doctor is interested in the benefits his treatments bring to people.
>
> . . . .
>
> These new definitions of information science and their implications for the practice of librarianship . . . offer the prospect to the profession of librarianship of really minsistering to minds and of understanding the interaction of information with people as we have never been able to do heretofore. (p. 6)

Becker, 1976:

> Imagine yourself in colonial America, looking around, 200 years ago. You would see the first signs of interest in books and libraries. You would observe what people are reading and you would witness the beginning of information science in America as we know it today. (p. 9)
>
> . . . .
>
> Let us accept the simplest definition [of information science]: the study of how man creates, uses, and communicates information. The principal component activities of information science are the production, organization, storage, retrieval, and distribution of information. (p. 10)
>
> . . . .
>
> The ability to distribute relevant information directly to a user wherever he is located is the overriding goal of information science.

. . . .

As we look around at the current scene we see that the types of materials and institutions concerned with the information-transfer process also are becoming more diverse and more numerous.

. . . .

We note too that information science is not a pure science--it is an interdisciplinary science. It derives its character from the convergence of several fields--librarianship, documentation, computers, communications, graphic arts, and others. (p. 13)

Schultz, 1976:

Overlap of "documentation" with librarianship had been recognized since the late 1940's, but in the 1960's it became clear that interests of those in the budding field of information science (growing out of "documentation") were well beyond interests of librarians or most documentalists. Information science included management and communication of messages of every kind and included the full cycle, from generation to use of messages. While certain information scientists were service-oriented, as is required of librarians, others became preoccupied with research into how to develop or apply new technology and how to measure operational effectiveness of efficiency, developing their own yardsticks as they went. (p. 50)

Houser and Schrader, 1978:

[We] assume that library science <u>is</u> a social science. Or rather, let us be very precise: we assert that there are fundamental problems relating to the production, collection, organization, dissemination and utilization of knowledge in all its various media forms <u>which demand to be treated and solved scientifically</u>.

. . . .

These problems, and still others, will assuredly be solved scientifically--if not by library scientists then by new breeds of social scientists who may call themselves information scientists, documentalists, information professionals or something newer still.

For the time being, reluctantly, we continue to refer to that profession which identifies itself by at least some of these general problems as library science. If the term has a false ring because it is so often not about libraries and even less often about science, at least it has a familiar sound. (We prefer putting new wine in old bottles.) Our concern is not the name of the profession but rather its practitioners and the education they have received and are still receiving. (p. 4)

7.9. Conjunctional Definitions about Objects and People: To use

Shera, 1950:

> Dewey, Cutter, Martel, and the others were groping for the application of a principle that we now know to be an established fact--that classification is basic to bibliographic organization, and that in large measure the success of our attempts to organize the graphic records of our civilization will depend upon our ability to devise systems for the ordering of those records in such a way as to maximize their social utility. This can be done only when we have adequately studied the different ways in which all such records are used by recognized groups within the society, and when we have analyzed the internal conceptual arrangement of such records in order to adapt any possible classification scheme to the existing structure of thought rather than to some abstract universal "order of nature" encompassing all knowledge. (pp. 79-80)

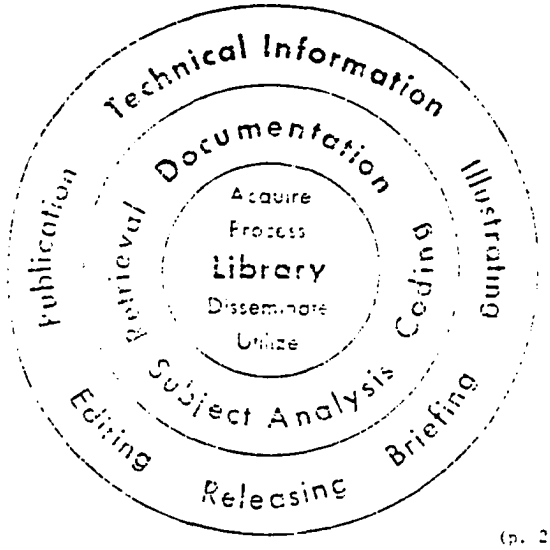
Björkbom, 1959:

> To Otlet documentation was equivalent to bibliographical control of the complete literature output of the different countries. Documentation in this sense was the task in the first line of the national libraries, which then should contribute to Otlet's famous Répertoire universel. Even his Manuel de documentation which was published as late as 1934, has no likeness to a modern handbook of documentation, but is just a book on library work and bibliography.
>
> It is now very curious to notice that some ten years later the word documentation had acquired a new meaning. It no longer dealt with the general bibliographical control but with the means of utilization of scientific literature within a special field. It is an intensive, not as before, an extensive activity. (p. 68)

Jackson, 1961:

> By 1980, special librarianship . . . will have absorbed many elements from documentation. A merger will have taken place, but the surviving member will not need a broader charter than the S.L.A. [Special Libraries Association] objective of "Putting Knowledge to Work." (p. 222)
>
> . . . .

FIGURE IV
A TECHNICAL INFORMATION SERVICE



(p. 217)

Shera, 1962:

> Moreover, it was in the attempt to escape from this dilemma of poverty in the midst of intellectual abundance that the much maligned discipline of librarianship known as 'documentation', was devised. . . . Documentation, if it is anything other than a semantic differentiation, may be regarded as a theory, a philosophy if you will, or librarianship that is dedicated to the exploration of new ways for improving the utility of recorded knowledge, for whatever purpose and at whatever level of use, by investigating and developing new means for the analysis, organization, and retrieval of graphic records. We would not go so far as does Mme Briet by asserting that animals in zoos are documentation, but we do maintain that a children's librarian can be as much of a documentalist as the most highly trained literature scientist serving the most esoteric requirements of a theoretical physicist. Documentation, then, is not a matter of degree, or even of intensity of effort, it is a credo--a professional philosophy. If the line between documentalist and librarian is difficult to draw, it is so because it is not a very important line except as it has been used as a whip to urge librarians into new areas of investigation and innovation. (p. 73)

Shera, 1965a:

> Librarianship, whether its practitioners recognize it or not, is based on epistemological foundations. The aim of librarianship, at whatever intellectual level it may operate, is to bring to the point of maximum efficiency the social utility of man's graphic records, whether the patron served is an unlettered child absorbed in his first picture book or the most advanced scholar engaged in some esoteric inquiry. Clearly, if the librarian is to become an effective mediator between man and

> his graphic records, librarianship must be much more than a bundle of tricks taught in a trade school for finding a particular book on a particular shelf for a particular patron with a particular need. Such techniques have a place in the skills of the librarian, but the librarian will do his job badly if he does not possess a true mastery over the means of access to recorded knowledge. . . . (p. 9)

Whatley, 1966:

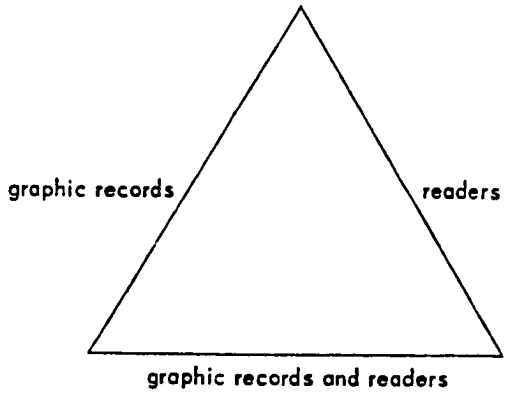
> By library science or librarianship is meant the study of all aspects of books and of libraries. Documentation is that part of library science which is concerned with the recording, storing, retrieval and use of recorded knowledge.
>
> Obviously there is so much overlapping in interpretation of these definitions that there is no useful purpose served in trying to place limits on each of them. Terminology changes and already there are signs that some people feel that the term documentation is due for replacement by such terms as Information science, or Information engineering. (p. 11)

Shera, 1968a:

> But the library is more than a link in the communication chain; as an operational system it is part of the total knowledge process--or of the knowledge situation at any given point in time. The knowledge process itself is a unity of subject, vehicle, and object. The subject is the self, the perceiver in the act of awareness (the library user); the vehicle is the instrumentality or mechanism through which the subject approaches the object (the library's bibliographical apparatus); and the object is the ultimate goal or referent, knowledge itself (obtained from the library's store).
>
> . . . .
>
> Since the objective of the librarian should be to maximize the social utility of graphic records, his bibliographic and information systems must be structured to conform as closely as possible to the patterns of man's use of those records and the transmission of knowledge within society. (p. 315)

Shera, 1968b:

> Librarianship in the generic sense, as a professional activity, is concerned with all of these agencies, operations, techniques, and principles that contribute to the objective of making graphic records as useful to society as is humanly possible, i.e., to maximize the social utility of graphic records for the benefit of mankind. One can, perhaps, best illustrate the social role of the librarian thus:



> It is the base of this triangle, then, that the social purpose of the librarian comes to focus. Documentation, therefore, as indicated above, is nothing more than a form, or aspect, of librarianship; it is, as the present writer said on another occasion, 'librarianship in a high key'. (p. 63)

Asheim, 1971:

> But librarianship is like teaching to this extent, that its skills and techniques are applied, not to librarianship, but to the materials and the interests of other fields--virtually all other fields. . . . All knowledge is our province, . . .
> . . . .
> [Let] me quote you a definition of librarianship recently devised to accompany a statement of policy on library education. "Library service is concerned with knowledge and information in their several forms, and specifically with their identification, selection, acquisition, preservation, organization, communication, and interpretation, and with assistance in their use." Nor is service to users limited to the current users of libraries, but to potential users as well, entailing the need to re-design old services and devise new ones, and to promote utilization of materials of communication of all kinds, to reach all who could benefit from them. (p. 28)

Rowley and Turner, 1978:

> The ever-increasing expense of obtaining and explointing . . . information is stimulating libraries and librarians to consider techniques hitherto regarded as either too specific or too extravagant. (p. 11)
> . . . .
> Information workers are dealing with a commodity, . . . (p. 13)
> . . . .
> To maximise the impact of the library service, the librarian or information officer should know something about his clients. . . . He will also be curious about how the library fits into the general pattern of information sources and communication. (p. 53)

Tell, 1978:

> [The] information function, the capacity to obtain, process and use information, is of utmost importance for any country. (p. 465)

Lewis, 1980:

> [Intelligence is] "the effective and efficient use of information for the better understanding and interpretation of your own, and your competitors' business".
>
> This definition opens up a whole series of related activities, ranging from writing surveys on competitive patenting to in-depth analyses of your competitors' commerical and technical intentions.
>
> With increasing subject specialisation by information staff, there is the possibility of providing further training so that the "intelligence function" may be carried out.
>
> . . . .
>
> As I see it, therefore, the evolution of the intelligence function from the information function represents a smooth transition, driven by the availability of information to the planner/intelligence man at his desk. (p. 71)

7.10. Conjunctional Definitions about Objects and People: To analyze

Shera, 1952:

> But by the close of the nineteenth century American librarianship had largely turned away from this original emphasis on the more effective bibliographic organization of its resources and had begun to think of the library as almost exclusively an agency for popular education. (p. 190) This diversion . . . had the disastrous effect of diverting librarianship from its proper concern with the analysis and organization of recorded knowledge, . . . (p. 191)

Shaw, 1957:

> Documentation is best differentiated from normal library service by the extent to which it is concerned with a complete-cycle system of providing information. This cycle involves the identification, recording, organization, storage, recall, conversion into more useful forms, synthesis, and dissemination of the intellectual content of print and other recorded materials.
>
> General library work tends to concentrate in the part of this cycle between recording and recall. Documentation completes the cycle by also dealing with identification, conversion, synthesis, and dissemination.

> Documentation is distinguished from general library work in two additional ways. It is more intensive--i.e., subject analysis is carried further, the range of resources accumulated is greater, etc. And documentation has the quality of special, as distinct from general, library service in its relationship to the specialized needs of particular users and uses.
>
> Thus the differentiation of documentation from general library work and from systematic bibliography is primarily a matter of degree. Library functions (such as acquisition, cataloging, and lending, which constitute part, but by no means all, of library work) are prerequisite to documentation. So, too, systematic bibliography (the listing of literature) is obviously prerequisite to the intensive analysis of intellectual content. If the documentalist or information officer performs the above functions he is, in so doing, acting as a librarian or as a bibliographer. The librarian initiates subject analysis in the cataloging process, but when he moves on to the intensive handling of the ideas contained on every page of every source, he starts to function as a documentalist.
>
> Because of the greater intensity of analysis of intellectual content involved in documentation (and librarians may function as documentalist) greater subject competence is usually required for this field than is required for general librarianship, including systematic bibliography. (p. 452)

Shaw, 1957a:

> Documentation is the identification, recording, organization, storage, recall, conversion into more useful forms, synthesis and dissemination of the intellectual content of print and other recorded materials, in relationship to the specialized needs of particular users and uses.
>
> The differentiation of documentation from general library work and from systematic bibliography is primarily a matter of degree of specialization of subject analysis. These fields are so closely interrelated that one person may, almost simulataneously, be performing functions in all three. Library functions (such as acquisition, cataloging, and lending publications--which constitute part, but by no means all, of library work) are prerequisite to documentation. So, too, systematic bibliography (the listing of literature) is obviously prerequisite to the intensive analysis of intellectual content. If the documentalist or information officer performs the above functions, he is, in so doing, acting as a librarian or as a bibliographer. The librarian initiates subject analysis in the cataloging process, but when he moves into the intensive handling of the ideas contained in every page of every source, he starts to function as a documentalist. (p. 15)
>
> Because of the great intensity of analysis of intellectual content involved in documentation work (and librarians may function as documentalists) greater subject competence is required for this field than is needed for general librarianship or systematic bibliography. Likewise, since intellectual content must be identified, ordered, and recast into forms more suitable for the specific need of a particular user or group of users, greater knowledge of the organization of the

> subject field, of research in that field, and of the methods and needs of workers in that field is required for documentation than for general library or bibliographical work. Finally, since the conversion of information into new forms is prerequisite, and the mass of objects to be handled is much greater when every idea and every page of every article must be subject to recall and manipulation, and since the transmission of information is requisite, the documentalist must be much more interested in the materials handling, converting, and transmitting systems than must the librarian and bibliographer who supply the raw material to the documentalist. (pp. 15-16)

Hagler, 1958:

> If we accept "special librarianship" as an offshoot of the library profession developed because of an unsatisfied need for more intensive, more detailed, more time-consuming reference work than was being engaged in by "general" librarians, then we can accept the new offshoot-profession of "documentation" as the product of still largely unsatisfied needs, felt particulary in government, business, and industry, for very technical and specific information pertinent to the most minute details of a research programme, and to be extracted by librarians from large masses of reports on the shortest notice. Because, however, of the relative and flexible meanings of these terms "detailed", "short notice", "technical", etc., "documentation" has never been generally defined, except in the broadest of terms. . . . Nevertheless, from the viewpoint of service rendered, "documentation" can just as well be reduced to the functions of the general or "public" library in its service to the serious inquirer, and be called "advanced reference service", or, to use Dr. Shaw's definition, "complete cycle information service". (p. 192)

Bjorkbom, 1959:

> As a matter of fact the only correct definition of the word [documentation] is, as I can see it, <u>bibliography and information librarianship adapted to special library needs</u>. The two distinctive features of these libraries in comparison to other learned libraries, regard the clientele and the library material. Their clientele consists of people who work in laboratories, not in the library reading rooms, and so need more help than the university professor, further, who are constantly up for time and do not have the patience of the ordinary scholar. Their special library material consists not of books but of articles in periodicals, technical reports, patent specifications, and what not--the user had no preference for any special form of scientific document, what he wants are facts. This accounts for all sort of rapid communication of scientific data, for more and more complicated classifications, for abstracts and summaries etc. etc., in one word for--documentation. (pp. 68-69)

Frank, 1961:

> Documentation and information work is of many kinds. It varies with the speciality and range of subject field, with the nature of the material to be exploited and according to the users for whom that material is intended. Correspondingly varied forms of organisation have been evolved to handle it.
>
> The oldest of these is the library which has the basic function of collecting publications of every kind and holding them in readiness for use. That function includes orderly arrangement of the holdings and the compilation of catalogues enabling a user to find the publications of particular authors or dealing with particular topics. But not all libraries of the traditional type combine this with the function, implicit in documentation, of analysing the contents of their holdings in finer detail. (p. 5)

Kent, 1961a:

> In this past decade, I have had some few contacts with librarians--contacts which have led to an increasing realization that the division between librarianship and documentation was not healthy for either. Nevertheless, documentation has been considered by many librarians as librarianship performed by amateurs, just as librarianship has been considered by many documentalists a passive activity that can cope with the general needs of adults and children, but not with the active industrial and governmental requirements of a modern society. (pp. 772-773)
>
> And so has developed a rift between natural allies for reasons that may have some reasonable basis when specific personalities are considered, but which are unfounded when the "science" of the two disciplines is examined, and found to be one.
>
> . . . .
>
> The purpose of a documentation (or information retrieval) system is to facilitate communication via graphic records over barriers of time, space, and language. This might also be accepted as a partial definition of the purpose of librarianship. And like librarianship, documentation involves a variety of basic operations:
> (1) Acquisition of graphic records of known or potential interest.
> (2) Analysis of these records, as a basis for organizing them in such a way as to simplify the identification of wanted information.
> (3) The control of terminology and subject headings used, to facilitate searching via information retrieval systems that are language based.
> (4) The recording of analysis results in such a way that a search may be performed conveniently.
> (5) Storage of source documents, extracts of documents, abstracts, and bibliographic references. (p. 773)
> (6) Analysis of questions that are to be put to information retrieval systems.
> (7) Conducting of searches.
> (8) Delivery of results of searches. (p. 774)
>
> . . . .
>
> So far everything that has been said could hold true for research in librarianship as well as for documentation and communication research. It is this basic similarity between the two fields that makes me wonder whether they are indeed two distinct disciplines.

> But certainly there are at least some details in the practice of documentation that distinguish it sufficiently from librarianship to account for a rift between the two. Perhaps the prime difference can be found in the documentalist's attempt to provide, in a convenient manner, a multidimensional approach to the analysis and retrieval of information. By this I mean that source documents may be characterized from more than one point of view, and retrieved by combining more than one aspect of subject matter. (p. 775)

Kaula, 1963:

> Documentation as a technique of listing microliterature appeared first in the field of natural sciences.
> . . . .
> Documentation as a modern technique of Library Science . . . [is] specialised service. . . . (p. 256)

Ranganathan, 1963:

> Documentation is a part of library activities. Therefore, the Five Laws of Library Science govern documentation . . . re-stated replacing "book" by "document". The five laws are then:
> 1 Documents are for use;
> 2 Every reader his document;
> 3 Every document its reader;
> 4 Save the time of the reader; and
> 5 A library is a growing organism.
> . . . .
> Documentation is library activity intensified by putting emphasis on:
> 1 Nascent thought, far more than on old thought;
> 2 Micro document, far more than on macro document; and
> 3 Specialist reader, far more than on generalist reader.
> . . . .
> Nascent thought is nowadays embodied quite often in articles in periodicals. (p. 43)
> . . . .
> No doubt, documentation is impossible unless backed by every facet of library activity--from document selection through acquisition, accessioning, classification, cataloguing, circulation work, reference service, and maintenance work to every detail of library management--developed to a higher pitch of efficiency. (p. 48)
> . . . .
> Documentation Service is the name taken by Reference Service when the emphasis shifts from macro to nascent micro thought and from generalist to specialist reader. It is intensified reference service . . . mostly long-range reference service. (p. 59)
> . . . .
> Macro thought--Subject of great extension, usually embodied in the form of a conventional book. (p. 27)
> Micro thought--Subject of small extension, usually embodied in the form of an article in a periodical, or of a section or a paragraph in a book, or of a pamphlet. (pp. 27-28)

. . . .

Documentation list--New name for bibliography with emphasis on the inclusion of micro documents and on the reader served being a specialist engaged in research, business, deliberation, or administration.

. . . .

Documentation work--Work of preparing a documentation list.

. . . .

Bibliography--List of documents listed together for some purpose. (p. 49)

Ranganathan, 1964:

> We seek to serve not only whole books but even articles in periodicals and parts of books. Further, in serving the scholars, we avoid stale documents and give only nascent ones produced perhaps the previous month or even the previous week. We call this "nascent micro-documents". To bring home to the scholars the institution of this improved form of library service, we have called the service by a new name--viz Documentation. The person practising documentation is called Documentalist. (p. 324)

Rothstein, 1965:

> I present to you the view that for most Canadians, the "documentalist" represents an extension or specialization within librarianship. In this view, the documentalist performs functions and services encompassed by librarianship but comparatively infrequently conducted in most public and university libraries. An incomplete but representative listing of such functions, skills and services would include some or all of the following: the design of special classifications; the control of atypical and ephemeral materials; the preparation of indexes, abstracts, translations, literature searches and "state of the art" reports; the selection and adaptation of appropriate equipment and machine techniques for the storage and retrieval of information. Such documentalists--and we Canadians would be far more likely to describe them as "special librarians" or "information officers"--are to be found principally in the service of the scientific and engineering community, and would be usually based in government departments, business and industrial firms, research laboratories and in large university libraries.
>
> If one views the work of documentalists as being essentially an intensification or specialization within librarianship, it follows that the chief responsibility for the education of such people devolves upon the graduate library schools. (p. 49)
>
> . . . .
>
> Nevertheless, it seems unlikely to me that Canada will soon see documentation divorced from librarianship. Whether the motivation springs from tradition, from the necessary economy of resources in training comparatively few students or, most tellingly, from the intrinsic logic of the interconnection of the two fields, I feel that Canadians will probably retain the view that documentation does not appropriately constitute a field separate from librarianship. (p. 52)

Asheim, 1968:

> [The] librarian's unique task . . . [is] the ordering of knowledge and its dissemination and interpretation to users. (p. 1100)

Batten, 1970:

> I will try to avoid the question whether the term "discipline" is well used in relation to either library or information work.
>
> . . . .
>
> A couple of decades ago, professional librarians were casting rather old-fashioned glances at certain upstarts calling themselves "information officers".
>
> . . . .
>
> I would hope that, by now, we might say that two things have happened:
>
> 1 The information side has acquired a degree of maturity, and with it an appreciation that it is bringing new and additional apparatus--rather than substituting for what is established.
>
> 2 The library side has seen that, where close discrimination amongst large numbers of small items is called for, rather special provisions are required to ensure their intellectual accessibility.
>
> . . . .
>
> The librarian . . . both enjoys and suffers a burden which, to my mind, forms no part of the information officer's world. I refer, of course, to his privilege and responsibility of physical custodianship--often of valuable and scarce material.
>
> . . . .
>
> The librarian carries another cross that is not always carried by the information officer. He is in the position of an investment adviser, translating cash (often inadequate, we know) into stock, and occasionally vice versa. (p. 307)
>
> . . . .
>
> The complementary problem of the information officer is also related to the wise disposal of funds, but on methods rather than upon stock. Often he has <u>no</u> stock--he manipulates representations of other people's stock.
>
> . . . .
>
> [The] emphasis on equipment and systems as <u>alternatives</u> to human staff is less fundamental in his [the librarian's] case.
>
> . . . .
>
> The librarian, I judge, must try to be all things to all enquirers. . . . [There] is room for an expertise that can discriminate between much smaller elements of information within a more constrained area of knowledge.
>
> It is in this matter of subject discrimination and intellectual seaparation that we have been at occasional loggerheads, . . . (p. 308)

Bryson, 1970:

> Perusal of the literature indicates that information scientists carry out tasks which lead to the completion of the same organizational functions as librarians--acquisitions, production, organization of materials, and the provision of services utilizing those materials. The chief difference between the two types of personnel seems to stem from the basic approach taken to provision of services, although this does involve a shift in emphasis placed upon the individual function of analysis of materials. (pp. 75-76)
>
> . . . .
>
> Because of the need-function development of the theory [formulated in the dissertation], and the fact that these are the same in both directions, this theory does include the information sciences within the scope of librarianship. (p. 76)
>
> . . . .
>
> [The] boundary between information science and librarianship becomes one of relations within librarianship when viewed in the light of the theory. (p. 77)

Mason, 1970:

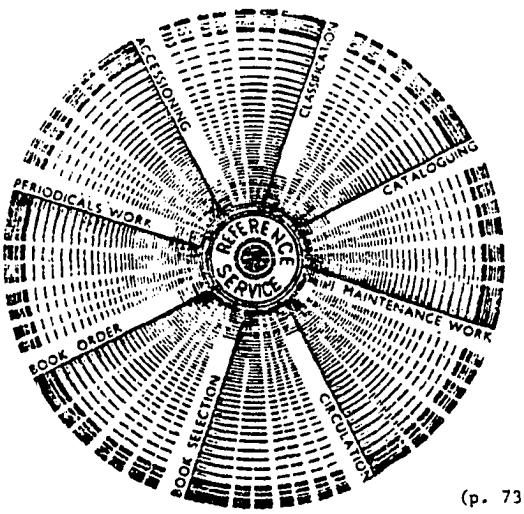
> As a general statement it is probably true to say that information workers are involved principally in information analysis, exploitation and support, and also in the editorial function; whereas librarians are involved in selection, acquisition and storage, information analysis and exploitation. Some librarians have editorial duties, some information workers are responsible for selection, acquisition and storage; thus there are at present certain distinctions between them, but a large amount of overlap, particularly in the area of analysis and exploitation of information. In most cases the difference in the overlap lies in the depth of subject approach. The librarian, because both professional tradition and professional education have encouraged him to be concerned in the totality of human culture, is usually concerned with a wide range of subjects, and this results in his analysis and exploitation having bibliographical rather than subject depth. The information worker, because of his specialist knowledge, is usually concerned with his own and related subject fields, and is therefore able to provide a subject analysis and exploitation service in depth. The two types of service are complementary and where it is possible, that is to say in the larger information services, librarians and information workers co-operate in providing a balanced service. Where it is not possible, the individual concerned has to endeavour to supply the deficiency, and since the majority of industrial information services operate with small numbers of staff usually with only one professional present, the current pattern demonstrates information workers and librarians providing both general and specialized services to the best of their respective abilities. The fact that there is little to choose between the services offered leads me to believe that there is only one profession, though I would hesitate to give it a name. . . . [It] should be possible to be a member of one professional body yet be engaged in basic research into information science, or applied research into systems, or in specialized or general information and library services. (p. 310)

Ranganathan, 1973:

> Thus, documentation service is only reference service of an intensive nature. Reciprocally, reference service may be taken to be only documentation service of a less intensive nature. To avoid multiplication of terms, we shall hereafter use the term 'Documentation Service' only, in the general sense of Reference Service, leaving it to be inferred, from the context, whether it is used in the restricted sense or in the unrestricted sense. (p. 30)
>
> . . . .
>
> Therefore, Documentation Work and Documentation Service, are compelling implications of the Laws of Library Science. And Documentation is an essential function of the Library Scientist. Of course, this new function has been realised only in recent years. Therefore, to emphasize this new function and to fix it in the minds of librarians the term 'Documentalist' is used to describe the librarian at the moment when he is doing Documentation Work or Documentation Service. . . . For a similar reason, we use the term 'Documentalist' instead of the term 'Librarian', whenever expedient. (pp. 66-67)
>
> . . . .
>
> Documentation Service is the Hub of all items of library practice if we take it in its entirety--its theory and its practice. (p. 77)

DOCUMENTATION SERVICE: HUB OF ALL LIBRARY WORK

1 A Pictorial Representation, in the form of a Wheel, of the Diverse Items of Library Work



(p. 73)

Ranganathan, 1973a:

> The documentation profession is concerned with the intellectual output of the specialists in diverse subject-fields. It should comprehend, organize, and serve the records of all such intellectual output. (p. 496)
>
> . . . .
>
> He should bring nascent micro documents into active use to satisfy Law 1 of Library Science; . . . .

. . . .

The need for improving the methods of eliciting the requirements of a specialist reader in precise terms and for correlating them to the entries in the documentation list should be brought home while doing reference service, which is called Documentation Service when applied to the service of nascent micro documents to the specialist reader. (p. 497)

. . . .

The organization for documentation is not the same as that for general library service. The selection, acquisition, routine of technical treatment, and the circulation of the micro documents, which are mostly without independent physical existence, are quite different from those of books.

. . . .

A precise formulation of the requirement of a reader is far more difficult in the case of a specialist than in the case of a generalist reader. Even to get a good approximation to it, the documentalist should, with the immediate help of the specialist reader, make a deep facet analysis of his requirements--deeper than in the case of a generalist reader. (p. 499)

Coblans, 1974:

However I think that it might be useful to try and capture some of the spirit of a period, especially since World War I, in which librarianship and documentation have come of age.

. . . .

[I] hope that students can be stimulated to see our present achievements and failures in the light of a fairly rich past--in other words 'information science' did not start with the computer. (p. 9)

. . . .

[Paul Otlet and Henri LaFontaine] insisted on the primacy of subject analysis and the related development of a universal classification, covering all branches of knowledge. In the climate of the times, still dominated by the author catalogue, this meant a break with traditional librarianship and the birth of a related activity with a new name 'documentation'. (p. 29)

. . . .

Originally bibliography and librarianship were all part of the same craft, though not a profession or even an accepted discipline. Embedddged in a dominant classical and literary tradition they were almost entirely centred on the book, above all the printed book. It was only in the nineteenth century that the natural sciences, with a growing emphasis on the periodical, the abstract and the subject approach, caused a covert split which slowly led to the emergence of documentalists as distinct from librarians. (p. 36)

. . . .

[It] is time that 'class' distinctions disappear and we start behaving with the assurance of a single and undivided profession. . . . The librarian 'switches' documents with only a broad subject specification of their contents; the documentalist or information officer with a deeper competence in a narrower field of knowledge 'switches' the information he extracts from the documents for a specific user;

> the scientist-integrator, working in what are called information analysis centres, collates and evaluates data and is thus able to compile critical reviews and standard tables of constants, etc. But at any one time or under local circumstances the roles can be reversed. It is a broad spectrum with overlapping regions--the librarian does documentation, the information officer has to concern himself with the organisation of libraries. The analogy of the general practitioner, the medical specialist, the bio-medical research worker can be matched all along the line. (pp. 119-120)

7.11. Conjunctional Definitions about Objects and People: To evaluate

Landau, 1966:

> Information work is distinct from librarianship and should in no way be confused with it. It is defined as the collection, collation, evaluation and organized dissemination of scientific and technical information, which includes such practices as (1) abstracting, reviewing progress and other similar technical writing; (2) translating scientific and technical writings; (3) editing such writings as emerge from (1) and (2); (4) indexing, subject classification and retrieval of scientific and technical information; (5) searching scientific and technical literature, preparing bibliographies, reports, etc.; (6) obtaining and providing scientific and technical information and tendering advice thereon; (7) dissemination of information and liaison and field work for that purpose; (8) research on problems in information work. (p. 225)

Wasserman and Bundy, 1966:

> Information personnel will be expected to go beyond the location and identification of material, and by virtue of increased subject competence, go on into evaluation and review of substantive content. (p. 5)

Farradane, 1967:

> Finally, the tasks of sifting, comparing and in any way evaluating information from the literature and other sources have largely been disclaimed as outside the prerogatives of librarianship.
> . . . .
> In this sense, 'evaluation' must not be interpreted as making decisions (which is the prerogative of the researcher worker and director), but as the tasks of presenting valid comparisons of facts or inconsistencies between different reports, and of drawing the attention of the researcher to duplications of work, gaps in available information, and other types of information which may bear upon the problems involved. (p. 12)

. . . .

In the United States there has not been as clear a division between librarianship and information work, chiefly because the approach to information retrieval problems has very largely been influenced by the rapid development of computers, to the extent that the term 'information science', which was coined by the Institute in Britain to cover the whole of information work, is now restricted in the United States to computer-based researches on information retrieval.

. . . .

In Europe the field has predominantly been called documentation, and those engaged in it are called documentalists, terms which have never become popular in Britain or the United States. . . . The implications of the very word 'documentation' seem to be expressed in an emphasis upon the handling of documents, reprography, and other techniques which make the work appear more like what is called special librarianship in Britain. (p. 13)

. . . .

It is also assumed that, in accordance with discussions given above, information work requires an education separate from that for librarianship. A resolution to this effect was passed at the 1955 F.I.D.-I.F.L.A. [International Federation for Documentation-International Federation of Library Associations] conference in Brussels. The information scientist does not need to study the organization of libraries--he is essentially a user, not an organizer, of libraries. . . . [It] is doubtful whether much more is needed than an understanding of up-to-date principles, a grounding on which the information worker can build if needed. (p. 14)

Schur and Saunders, 1968:

[The] role of librarians and information workers, as colleagues and aides of the "bench" scientists in their quest for information, is of crucial and ever-increasing importance. . . . [The] organisation and controlled dissemination of such information [which is the end-product of research and development] must surely warrant very high priority.

. . . .

[The] scientific information worker has a significant contribution to offer [to the problem of increasing specialisation and the need for an inter-disciplinary approach]: assisting the specialist to "get into" the literature of a fringe field, detecting the significance of work in one field for research being carried out in another, "seeing relevance in apparently unrelated facts" . . . , these are activities which many believe to be amongst the most valuable of all the functions of the professional information worker. (p. 2)

. . . .

There is still no general agreement about the meaning of many of the commonest terms used in scientific and technological library and information work. Even "librarian" and "information scientist" mean different things to different people, so that their respective roles are extremely difficult to define. It is sometimes said, for example, that the librarian is the person who organises the material which the information scientist uses, and it is certainly possible

> to envisage a spectrum of activity with the librarian at the one extreme and the information scientist at the other. But there is a very extensive middle band where the distinction becomes blurred and their functions overlap and intermingle: there are many librarians who, in addition to organising their libraries for use, are expected to carry out literature searches and evaluate what they find, and many information scientists whose involvement with the literature is not restricted to its use but also requires some concern with its organisation. Indeed, we have been urged during this enquiry, time and again, to stress the unity and interdependence of library and information work and the artificality of any attempt at rigid separation. (p. 4)

Fujikawa, 1969:

> In general, the documentalist is distinguished from the librarian by his capacity to analyze and evaluate the literature of a specialized field of science or technology, and, recently, the field of the social sciences. In contrast, the librarian is expected merely to process information sources in a variety of physical formats in accordance with established rules and codes, even if he is capable of interpreting scholarly library materials and introducing them to the researcher.
>
> . . . .
>
> If there is an apparent difference between the two fields, it would seem to lie in the fact that in information science the articulated and algorismic [sic] approach is held in high regard, while in librarianship there appears to be a stress on subjective personal interpretation of established modes. (p. 115)
>
> . . . .
>
> In information science as it has developed to date, solutions are "sign oriented" (where "sign" is used in a broad sense, including symbols and codes and formulations). That is, proposed problems are examined and judged by formulated and established criteria, which are exact in form and distinguishable in terms of measure or scale. In librarianship, with the exception of the large domain of administration, solutions are heavily "behavior oriented." That is, proposed problems are examined and judged in terms of individual motive, inner desire, opposition to the contrary opinion, etc. Here interpretation is considered a kind of behavior. (p. 116)

Caldwell, 1970:

> [Information science] is, I submit, significantly different from librarianship, yet with sufficient common basic ground to indicate that it derived from librarianship in the first instance.
>
> . . . .
>
> [The] librarians' function has been to acquire, record and generally organize this [recordable] material for use.
>
> . . . .
>
> If librarianship is concerned with the interaction of people and ideas, it must inevitably become involved in understanding both of these much more than it has tended to do, or wanted to do in the past, whilst continuing to advance on the organizational front, . . . (p. 138)

. . . .
The problems of access to information and bibliographical structure are common to information science and librarianship; the principles of administration and management apply equally, even if the detail of their application varies, and is probably of much greater importance in librarianship because of the greater size of the units of service involved, and the number of staff to be controlled. (p. 139)
. . . .
By the nature of the work he is called upon to do, particularly the analysis and assessment of the significance of incoming information to his organization, the information scientist must be very closely in contact with the work his organization, or particular persons within it, are doing, and indeed, he is in a sense directly involved in such work. (pp. 140-141)
. . . .
Thus we may find that while librarians will continue to do, and do better much general information work, in the more specialized situations information scientists will have a definite role to play. They will be users of libraries in many cases, rather than managers of them . . . ; their functions will be complementary to those of librarians, and not in competition with them. Both may be employed by the one organization. This has happened in industry already; . . .

It is clear also that information scientists may function in some situations where a librarian might not be appropriate. As examples, one might cite their use, actual or potential, as information assistants for editorial work in journalism, in market research, banks, publishing groups, public relations work, and in programme research for radio and television. (p. 141)

Malan, 1971:

The information function is regarded as an integral part of the library function. . . . The conclusion is drawn that communication and information science in respect of library science cover one and the same field. From the suggested definitions the following fields of study are identified: 1) documents (selection, acquisition, indexing, storage, retrieval); 2) information (its selection, indexing and storage, and its retrieval, evaluation, and presentation); 3) information science as a discipline (study of acquisition, transfer and use of information methods); 4) management and organization (reorientation of these factors in light of developments . . . in the information function). Closely linked with this item is the study of systems analysis and development. (p. 246)
. . . .
[The] following broad fields of activity can be indicated:
1. Selecting, collecting, arranging, conserving, and retrieving documents and information.

In this case we are dealing with the librarian and if it is a specific subject field, with the special librarian, known in Europe as the documentalist. The activities in this connection are called library science, information science and documentation science, as the case may be.
2. Selecting, evaluating, interpreting, and presenting information in a specific subject field.

> In this case the terms information specialist, subject information specialist or even technical literature analyst are used since this person is an expert concerned with the evaluating, interpreting and presenting information for a fellow expert, although he may not always be quite as specialized.
> 3. Studying the processes and methods, channels and aids concerned with the dissemination of knowledge and information.
>
> In this case we have the information scientist and the field covered is that of information science.
>
> Incidentally, the demarcation between the work of the librarian in carrying out his information function and that of the information specialist cannot be easily defined. (p. 249)
>
> . . . .
>
> 4. The receiving, arranging and referring of enquiries in any organization for the dissemination of knowledge by suitable persons, bodies (such as associations and research institutes) and organizations (such as libraries, especially special libraries, and documentation centres).
>
> In this case we have an information officer.
>
> Naturally the terms as used above are not all-inclusive or all-exclusive. It will be extremely difficult to define them as such, since the various fields overlap. For our purposes, however, these definitions are a starting point. The activities of the whole field is defined as information science to differentiate it from library science which deals with the organization of documents and information in libraries, and documentation science which deals with the organizational methods used for documents. (p. 250)

Taylor, 1973:

> Our information systems have been concerned with the supply rather than with the filtering of information, with the consequence that we have developed a new form of pollution--information glut. (p. 66)
>
> . . . .
>
> Figure 1, a Venn diagram, basically shows three general subjects of concern--information, people, and technology. There is a fourth area which overlays all of them: research.
>
> . . . .
>
> Libraries have traditionally been concerned only with the information base--that is, with the gathering, collecting, organizing of the artifacts of information. (p. 67)
>
> . . . .
>
> We have not asked the more significant question--what is the role of information in the life of society?
>
> . . . .
>
> We must become interpreters and filters for society. We must find ways of developing self-assurance, judgment, selectivity, empathy, and impeccable fairness in our students. I have no easy solution for this and I rather guess the most important variable may be the person in the librarian rather than the librarian in the person. (pp. 70-71
>
> . . . .
>
> Because I consider the library/information profession at the center of the needed process of change, I believe our students must know the effects of innovation, the prospects of alternative systems, and the processes of technological and social forecasting. (p. 71)

. . . .

Information science is concerned with the education of persons who will undertake fundamental investigations directed toward the phenomena of message generation, storage, organization, structure, filters, and transfer. . . . Its objective is to explicate, to state, and to test hypotheses relevant to information systems and communication environments. (pp. 84-85)

Information engineering is directed toward the design and testing of devices and systems useful for the solution of actual problems in operating environments. Its principal concerns are the design of experiments and the evaluation of results in operating systems. Information services . . . is directed toward the training of persons for service functions in information centers and other knowledge dissemination systems. (p. 85)

. . . .

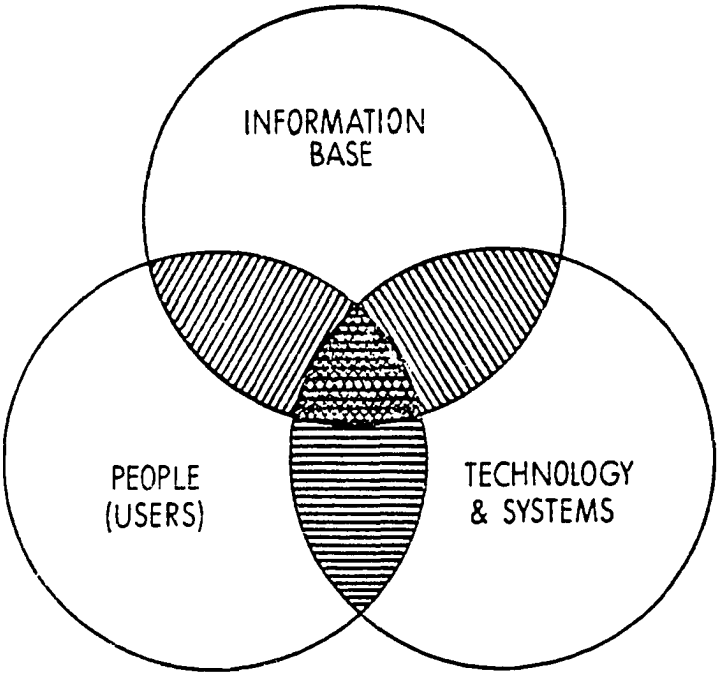


FIGURE 1 (p. 68)

Larson, 1975:

> Although the work cycle [of information management] may be entered at any point, for purposes of analysis the appraisal point is the start. The information manager has adopted appraisal criteria based on some standard. These appraisal criteria are then applied in inventorying the materials, collecting those to which the criteria apply, cataloguing these materials, and then providing access to them. The information manager therefore has an intellectual role in the continued research and in interpretation of materials, leading to revisions that affect the appraisal; thus the redefinition requires a different inventory, new collecting, new cataloguing, new references. The circle never stops. This work cycle is common to all information managers. (p. 7)

Sergean, 1976a:

> The final characteristic feature of the field that I want to talk about is its lack of definition, i.e. the absence of precise and generally-agreed boundaries about whom we should be concerned with, about what kind of information is the legitimate province of the information specialist and about what activities may be included under the heading of 'information work'.
>
> . . . .
>
> [In] industry, in commerce and in the professions are to be found many personnel (e.g. accountants, taxation experts, investment consultants) whose work is substantially concerned with acquiring and compiling information; analyzing, appraising, and manipulating it; making it available either in standard form for general consumption or tailor-made for the use of a particular person or group. (p. 3)
>
> Such personnel will not think of themselves primarily as information specialists; nor will they be so regarded by others. But account has to be taken of their contribution if we want to answer the question, not, 'What do information workers do?' but the complementary question, 'How does information work get done?'
>
> . . . .
>
> What is legitimately the concern of the 'information specialist' in one situation will legitimately not be so in another. There is always likely to be considerable overlap between the information activities of the 'expert' and the layman. Information work is always likely to remain to a marked degree a do-it-yourself occupation.
>
> . . . .
>
> The acceptance and encouragement of a do-it-yourself approach by the provision of training in information-handling for the 'laity' . . . is not necessarily incompatible with the development of a specialist elite. The trained information specialist and the trained librarian would be involved in this lay training programme and their role might become more educative, consultative, advisory and less practitioner, than at present.
>
> . . . .
>
> [In] the field of information what I look for is greater self-sufficiency--a situation where everyone is his own information specialist, aware of the importance of information and information needs and competent in the use of techniques of information presentation and handling. (p. 4)
>
> . . . .
>
> In this survey we regarded 'librarianship/information work' (as practised by the 'librarians' and 'information workers' in our sample) as a single service activity dealing with a common commodity (namely, information) of various kinds and in various forms. We saw all jobs occurring in the libraries and information departments in our sample as 'information' jobs and all personnel as 'information workers', in that they were concerned in some way or other with the acquisition, handling, and dissemination (in the broadest sense of these terms) of information.
>
> This applies whatever the purpose or setting involved. Cultural and recreational material (in a public library situation) is just as 'informative' as is advisory or instructional material (in a special or academic situation) if one regards information in its basic sense of that on which attitudes, decisions and behaviour are based. (p. 5)

Bottle, 1977:

> Both librarians and information scientists handle information. I believe that if one must differentiate, then one can say that the person handling (non-recreational) information, who has sufficient understanding of it to evaluate it, is an information scientist, ... (p. 38)
>
> . . . .
>
> Originally information science and science information were more or less interchangeable terms, ... Recently, however, some of us have managed to persuade the Institute [of Information Scientists, in Great Britain] that it would be quite possible for an English literature graduate to work in, say, a Shakespearian research institute as an information scientist. . . . (Recalling my original definition that an information scientist is capable of evaluating a high proportion of the information handled on behalf of his clients, it is an intriguing thought that someone who has taken only an undergraduate degree in librarianship could be an information scientist in a library school library, even if nowhere else.) (p. 39)

Rowley and Turner, 1978:

> The individual subject knowledge of each person is transformed into objective knowledge by each individual's public expression via speech, writing etc. Objective knowledge is publicly observable by all and is essentially the wisdom of past generations collected together in our archives, libraries etc. It is the learning how to apply more effectively the objective knowledge that we have that is to become the real role of information science. (pp. 16-17)
>
> . . . .
>
> It is primarily at the stage of objective knowledge that most information workers become involved in the model. The role of the information worker is to analyse, disseminate and use in the most efficient way the objective knowledge available to him. (p. 17)
>
> . . . .
>
> [The librarian's] role hitherto has been one of acquisition and dissemination, with a reliance on the user to judge value and quality. The newly emerging role of the librarian as some sort of technological gatekeeper would suggest a far greater screening or qualitative attitude. (p. 37)
>
> . . . .
>
> The information services that are being discussed in this work all involve some form of dissemination. By dissemination is meant a service that actually takes the information to the user, preferably before he has to formulate a demand for it. In other words, current-awareness services, in the broadest sense of the word; and those parts of management information systems that involve published public data.
>
> . . . .
>
> Traditionally, dissemination services have been the province of the specialist library or information unit serving science or technology. (p. 128)

. . . .

This traditional view of information services being provided primarily in the science-technology area by small units is now no longer valid. It may be that it never was a correct view, but merely a long-held myth of information work. The change has taken place with regard to both size and type of unit, and subject area served. In general terms the trend has been towards all types of library, from public to academic, providing information services. Also the subjects disseminated are now no longer merely science and technology. Almost all aspects of most subject areas are now disseminated by some library somewhere. (p. 129)

7.12. Conjunctional Definitions about Objects and People: To manage or control

Shera, 1951:

Though the term 'documentation' is not of recent origin, attempts to define it precisely have been conspicuously unsuccessful. . . . Egan and Shera avoided the issue by making documentation a part of what, on this side of the Atlantic, is usually understood as 'bibliographic control', a term which, incidentally, they have rejected in favor of 'bibliographic organization'. (pp. 1-2 in Foskett, 1966)

. . . .

[It] seems clear that documentation is limited to that aspect of bibliographic organization which treats of the materials and needs of scholars and, hence, is concerned with the scholarly apparatus of bibliographies, indexes, and abstracting services. . . . It is not concerend with the flow of communication at the popular, nonspecialist, or lay-public levels. Obviously, it is <u>not</u> concerned with the great bulk of the mass communication media, which are completely under the control of the transmitting agent, such as the radio, motion picture, or newspaper, <u>except</u> as such materials may have historical significance. (p. 2)

Shera, 1952:

In 1937, American librarians first officially recognized documentation as an important bibliographic discipline by organizing the American Documentation Institute. (p. 192)

. . . .

From this review one may conclude that bibliographic organization is an historical unity comprising as its major constituents general librarianship, special librarianship, and documentation. One may further conclude that special librarianship and documentation have a common root, and that their divergence has been largely an historical accident, the results of which were intensified by differences in terminology rather than in kind. (p. 193-194)

Shera and Egan, 1953:

> Bradford was not only a 'documentalist' in the restricted and technical sense but in addition he was a scientist and a librarian, and thus he is himself a symbol of the real unity that brings together under the comprehensive term 'bibliographic organization' the professional interests and activities of both documentalists and librarians--a unity that is given substance and precision by being founded upon scientific training. (pp. 21-22 in Foskett, 1966)
>
> . . . .
>
> But there is no novelty about documentation as a discipline for the organizing of graphic records. Bibliographies of a restricted scope appeared long before the age of the manuscript came to an end. . . . Thus subject bibliography, the early manifestation of documentation, is almost as old as the practice of librarianship itself, and in the beginning the one was quite indistinguishable from the other. (p. 23)
>
> . . . .
>
> As the documentalists became the pioneers in this emerging discipline of bibliographic organization an ever-widening gap separated them from the librarians, and in this schism both have suffered unnecessary losses. (p. 36)

Shera, 1961:

> The aim of librarianship, at whatever intellectual level it may operate, is to maximize the social utility of graphic records, whether the patron served is an unlettered child absorbed in his first picture-book or the most advanced scholar engaged in some esoteric inquiry. Therefore, if librarianship is to serve society to the fullest extent of its potentialities it must be much more than a bundle of tricks for finding a particular book on a particular shelf for a particular patron with a particular need. To be sure, it is that too, but fundamentally, librarianship is the management of knowledge. . . . The librarian is the supreme 'time-binder', and his is the most interdisciplinary of all the disciplines, for it is the ordering, relating, and structuring of knowledge and concepts. (p. 16)
>
> . . . .
>
> To general semantics librarianship should contribute new insights into the structuring, organization, and availability of human knowledge. It should bring order and viability to a proliferation of recorded knowledge that threatens to become self-suffocating. To librarianship general semantics should be able to contribute the fruits of social epistemology--the very foundations of the librarian's theoretical knowledge, . . . (p. 17)

Needham, 1964:

> Bibliographic organization is that part of the organization of the means of communication which is concerned with the organization and control of publication and publications.
>
> The function of bibliographical organization is to ensure that documents are adequately published, housed and recorded; its purpose is the efficient identification, selection, and location of these documents as required. (p. 9)

. . . .

Bibliographical devices are devices used to facilitate bibliographical control and so, broadly, they include all forms of librarianship and bibliography. (p. 10)

. . . .

The two bibliographical devices selected for examination in this book are known as retrieval devices; they are prepared specifically to facilitate the retrieval of documents from a particular store, the store, for our purposes, being a library. They are:
(i) the arrangement of documents on the shelves, and
(ii) the catalogues (including booklists, etc.), recording the documents.

. . . .

We have already said that the function of bibliographical organization is the adequate housing and recording of documents. (p. 11)

Shera, 1965a:

> The librarian's responsibility is the efficient and effective management of the transcript, the graphic record of all that society knows about itself and its world. It includes that which the social organism has learned, its values as well as its facts, its imagery as well as its reality; . . . (p. 25)

Baxendale, 1966:

> This lack of recognition of the similarities between current problems and previous solutions leads to the third observation: the unfortunate introduction of needless ambiguities into the language of documentation. . . . It is clear that the illusory boundaries being drawn between documentalists and librarians are based not so much on differences in purpose and activity as on mutually unrecognized synonymies in language and in practices. This state of affairs has inhibited communication. It will be regrettable if artificial distinctions are frozen into the curricula currently being formulated by the universities. The reality is merely that nonconventional devices, such as the computer, have added a new dimension to documentation. They have introduced the system engineer to the library, and he is demanding keener insights, fresh approaches, and new skills of the library and documentation community. (p. 73)

Slamecka and Zunde, 1967:

> Science information work shows clearly a long-standing concern with document control and with the use of information in organized activities of man. Documentation has exceeded librarianship in both of these concerns: it seeks to obtain a greater degree of control over recorded literature; to exercise this control over a larger universe of recorded information; and to accomplish a more dynamic rapport between information and its users. Documentation has attained these objectives by improving on some of the tools and techniques of librarianship, and by devising some new ones.

. . . .

In the past few years, however, the concern of the more advanced levels of these professions has passed, at least partially, from a preoccupation with skills to the concern with 'systems' for science information control and use. The documentalist in particular has become a professional concerned principally with the design and operation of integrated processes and procedures for the control of recorded information; and with the efficiency of the sum of the operations. (p. 50)

. . . .

The thesis of this paper is that professions concerned with the control of information have a very general base--information engineering--which subsumes the functions of the 'unit processes' as well as of those of the document systems specialists. The proper province of activity of the profession of information engineering is the design and operation of information processing systems and their components. (p. 51)

Wilson, 1968:

Discovery of the valuable in the mass of the mostly worthless or uninteresting [writings of the world] is a major ingredient in the problem of bibliographical control. (p. 1)

. . . .

Two notions will be singled out for particular discussion, largely critical: the notion of relevance, central to the study of information retrieval, and the notion of the subject of a writing, central to library practice. (p. 2)

. . . .

Organization is, we might say, a structural notion, while control is a function notion; organization is something that things have or are given, control is something we have or wield over things. In theory the two notions are distinct, but in practice one cannot talk of control without talking of organization, for one of the chief ways in which we control things is by taking advantage of the organization they exhibit. (p. 3)

. . . .

Finally, the relationships between the organization and control of writings and the organization and control of knowledge and information will inevitably enter our story, for writings contain, along with much else, a great deal of mankind's stock of knowledge and information. Bibliographical control is a form of power, and if knowledge itself is a form of power, as the familiar slogan claims, bibliographical control is in a certain sense power over power, power to obtain the knowledge recorded in written form. As writings are not simply, and not in any simple way, storehouses of knowledge, we cannot satisfactorily discuss bibliographical control as simply control over the knowledge and information contained in writings. But the concepts employed in attempts to theorize about information storage and retrieval are inevitably concepts of greater or lesser importance to our study; the conceptual inventories of the studies of bibliography and of information storage and retrieval overlap largely if they do not coincide. (pp. 4-5)

. . . .

The history of bibliography and librarianship is not a short one. But "records management" and "information retrieval" are of wider concern than ever before, . . . (p. 5)

Penland, 1971:

New principles of communication science are needed by library and information specialists in order to meet the demands for information control and transfer in community development and the managerial revolution. . . . Cybernetic communication shifts in emphasis from message design and transmission to the creation and management of communicative situations that involve both sender and receiver. (p. 423)

. . . .

Communication is the continuous, pervasive, and comprehensive collectivity of all mechanisms, organisms, and the physical universe. The range of information that can be a message to an organism is enormous compared to a machine where the information usable by a mechanism has to be programmed. . . . Anything that can be perceived can be a message. (p. 425)

. . . .

The basic model of communication is still the ubiquitous one proposed by Aristotle and includes the sender, the message, and the receiver. (p. 426)

. . . .

Communication science is the study of interrelationships of the Gestalt of human activity with the totality of the environment. Communication science investigates reciprocal intentions or meaning within or among adaptive control mechanisms and organisms, and the significance of information modulations upon behavior. It includes information science which primarily measures the range of information modulations that are possible from a store of recorded knowledge, and secondarily considers their social patterns and personal significance. (pp. 429-430)

. . . .

[The] systems approach to knowledge . . . has had a considerable impact upon communication science by widening its scope of investigation to include relationships beyond the considerations of Aritotle's elementary processes of sender, receiver, and data transportation. At present, information science and communication science vie with one another as the integrative profession while systems theory may be the integrative discipline. (p. 431)

. . . .

The assumptions and principles of cybernetics are sufficiently general to consider it a unified approach to communication.

. . . .

Cybernetics is the science of control and communication in the animal and the machine.

. . . .

The advantage of the cybernetic model is that it transcends subject boundaries and views people and animals as adaptive control systems of reception, transmission, evaluation, and storage. Input is perception; judgment is decision-making; and output is behavioral action. (p. 432)

. . . .

People, animals, and machines can be viewed as systems of reception, transmission, evaluation, and storage. (p. 433)

. . . .

Cybernetics, of course, is the fundamental discipline upon which general systems theory is largely built. (p. 434)

Fairthorne, 1972:

The function of libraries in particular, and of Informatics in general, is not the pursuit of knowledge as such, but of knowledge of what people have had to say. In short, Informatics is concerned with the management of messages, not with their creation or application.

One key task of message management is to isolate some fragment of a text or diagram or record without compelling the reader to hunt through all of it.

. . . .

[This] is called Data Retrieval, an Activity that aims to satisfy the very common requirement for a part of a text or record as opposed to a request for the whole of it. (p. 99)

. . . .

What makes the sequence of digits or the alphanumerical expressions cited become 'data' in the sense of Data Retrieval is the fact that they are required by themselves in isolation from the rest of the text. What makes texts or records 'data' therefore does not depend upon its symbols, wording, or topic, or any intrinsic characteristic, but upon how it is to be used. (p. 100)

. . . .

Data Retrieval, or 'look up' is an essential preliminary to all forms of'question answering' and other inferential procedures from records, whether automated or not.

. . . .

Also, though this is often overlooked, you cannot begin to perform even simple look-up unless you first perform ordinary Document or Record Retrieval. For you must first get hold of the appropriate documents from which the segments of text are to be extracted. (p. 100)

. . . .

Because a document is not a fixed unit of discourse but varies with how the records are to be used, there is no fixed level at which document retrieval ends and data retrieval begins. On the other hand, no single application of a bibligraphical method, such as subject classification, can extend unchanged down from the collection as a whole into the ultimate words or signs of the records without changes of criteria. (p. 101)

. . . .

The differences between document and data retrieval arise only from different choices of unit of discourse or record. From the point of view of question answering in the wide sense, they are both tools of Reference Librarianship in the wide sense. They must not be regarded as distinct, but as governed by the same principles, and as liable to merge one into the other, whether the records used are mathematical tables, musical scores, maps, sound recordings, or novels.

. . . .

The root problems of Data Retrieval remain those of Document Retrieval, both in the bibliographic (descriptive) and semantic (topic, subject) aspects. We have to find how much social and linguistic experience of various activities must be built into the system, and also to find how to build it in. These problems are common to applications in both the sciences and in the humanities. (p. 110)

Shera, 1973:

[Librarianship] is fundamentally a bibliographic enterprise, regardless of the sophistication of the clientele. . . . By the term "bibliographic activity" we would mean to include all those operations, functions, and insights that are required to bring book and user together in an intellectually rewarding experience, and not just putting together, under appropriate headings, a listing of titles. (p. 102)

. . . .

The bibliographic enterprise is composed of three constituent elements: acquisition, which means knowing what materials to acquire and how to acquire them; organization, the arrangement and analysis of the materials so that their intellectual content will be appropriately available; and service, which is assistance to the reader. (p. 103)

Horton, 1974:

[Clearly,] the production, handling, and dissemination of information has come of age as a respectable industry. . . . And yet those primary disciplines concerned with improving the management of information--computer science, automation, library science, communications, and information science--have failed to intermesh theory and practice in order to harness total available information resources in the most efficient and effective ways to support users. By "information resources" I embrace the full range of producers, suppliers, handlers and distributors, and include information in all of its forms, documented and undocumented, raw data and evaluated information. And I embrace library holdings, information center holdings, data in information systems and computer data banks, office files and records, newspaper clippings, sound recordings and films, corredpondence and messages, and other information storage and handling media and forms. (p. i)

. . . .

[This book] reviews, step by step, how the systems approach can be successfully applied to helping an organization or an individual maximize the use of available information resources by considering the problems of storage, handling, and retrieving information in a broad context. It is a methodology, or a means of helping get at sources and types of data needed.

The systems approach looks at every facet and each stage of the problem, beginning with the purposes to which information is put. Thus, problem-solving, decision-making, current awareness, and retrospective objectives are all considered, as well as other purposes. (p. ii)

. . . .

[Systems science] is concerned with applying two modern management concepts, systems analysis and the systems approach, to the problems of information handling. . . . [These] concepts are central to the theme of this work, . . . (p. 7)

Foskett, 1975:

[Some] past differences of opinion on the nature of information science as distinct from librarianship have centred on this very factor--that information specialists are not particularly concerned with management, being usually part of a larger organization with its own professional management staff. The fruitfulness of the systems approach lies precisely in the fact that it views every group as having its own existence as an entity exhibiting its own characteristics, as well as being related, in diverse ways, to many other groups, each also having its own characteristic features.

On this view, no new technical or theoretical advance, however powerful, will be considered as an end in itself, but as part of, and contributing to, the already existing corpus of accepted professional knowledge. It will modify, refine and enhance that corpus, but will not replace it; equally, it should not be regarded as an unwelcome excrescence to be isolated and quarantined from the rest of the corpus, for in such a case there will be no interaction and no improvement in either direction. (p. 25)

Larson, 1975:

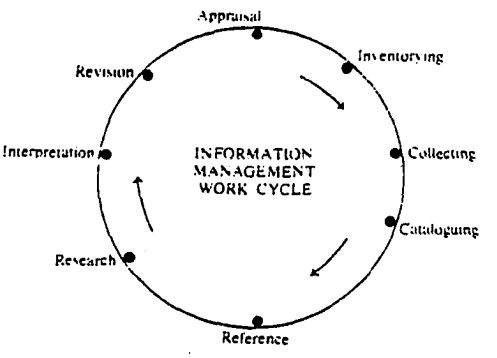
By this paper's definition, any person who acquires, catalogues, preserves, and makes available information for a defined constituency belongs to the information managers' profession. This profession is composed of five separate, distinct subprofessions: librarians, archivists, records managers, audiovisual specialists, and information scientists. (p. 5)

. . . .

The role of the information manager has always involved the same components: the acquisition of information in whatever format it is created in, the intellectual description and arrangement of the information for potential users, the technical preservation of the information format for a set amount of time, and the actual physical delivery of the information to the user.

. . . .

Fig. 1 – *Information Management Work Cycle*



(p. 6)

Kubatova, 1978:

> [The] concept of management information systems necessitates the creation of a theory adequate to the complex development of social processes and their socio-economic character. Here arises the situation in which design of information and management systems meeting modern and future requirements of society demands a search of a new scientific approach to decision-making. The development of a theory and methodology of the scientific discipline which would study these problems in their relationship is the call of the time. Along with the name 'information science' other names ('information theory of management', 'social cybernetics' and a number of others) are also provisionally used to define the new discipline. (p. 64)
>
> Hence, it can be stated that at a certain development stage both types of information systems are facing similar problems. We believe that the common feature of both information systems and the common stimulus for the development of their theory is the fact that the systems in question are social information systems. . . . The most general goals of these systems include information support of the development and dissemination of scientific knowledge (traditional scientific and technical information systems) and information support of management of social processes (batch data processing). But as information intended for the development and dissemination of scientific knowledge is increasingly used for the management of social processes tooo, it is obvious that scientific and technical information systems should particpate in meeting basic information needs of management. Thsu, there emerge problem fields of social information systems and their rational functions for management and planning of social development. We think that it is precisely this problem area which is the problem field of the new scientific discipline called 'information science' which studies special information and its functions in the management of social processes. (pp. 64-65)

Horton, 1979:

> The information manager directs the overall organizational information management program or a major subcomponent thereof. The program encompasses the coordination and synthesis of the many disparate functional activities and programs in an organization which support its data, information and knowledge needs. These include libraries and information centers, automatic data processing programs and computer centers, archival and records programs, telecommunication systems, statistical programs, word processing, micrographics and other microforms, printing and publishing, copying and reproduction, paperwork management, reports control, forms management, management information systems, scientific and technical information programs, and other related activities. (p. 36)

Horton, 1979a:

> Which are the "information disciplines?" How do they relate to one another now? And what can be done to bring them together? In my view, probably there are eight or nine major planets in our "information solar system." . . . What each has in common is that data and information--or, facts, figures and symbols--are their main subject-matter, concern and interest. In short, information is the common denominator of all of them. They are:
>
> - computers, and associated automation technologies;
> - the theory and practice of statistics and probability;
> - communication and telecommunication;
> - publishing, printing and replication;
> - libraries and library science;
> - microform and miniaturization technologies;
> - the information sciences;
> - the systems and management sciences; and
> - the information arts.
>
> Every one of these professions has been working to advance mankind's capability to collect, process, store, utilize and disseminate data and information more effectively and efficiently. (p. 67)
>
> . . . .

THE INFORMATION SOLAR SYSTEM

	COMPUTERS & AUTOMATION	COMMUNICATIONS & TELECOMMUNICATIONS	PUBLISHING PRINT & REPL	MICROFORM & MINIATURE	STATISTICS & PROBABILITY	LIBRARY SCIENCE	MANAGEMENT & SYSTEMS	INFO SCIENCE	INFO ARTS
COMPUTERS & AUTOMATION									
COMMUNICATIONS & TELECOMMUNICATIONS									
PUBLISHING, PRINTING & REPLICATION									
MICROFORM & MINIATURIZATION									
STATISTICS & PROBABILITY THEORY									
LIBRARY SCIENCE									
MANAGEMENT & SYSTEMS SCIENCES									
INFORMATION SCIENCES									
INFORMATION ARTS									

Figure 3-5.

(p. 68)

> . . . .
>
> The Information Resources Management System can be viewed as a framework within which to accomplish the management of data resources in an orderly and systematic fashion. . . . [The] challenge of the system is to marshall data and information resources and use them effectively and efficiently in the service of man's decision-making and problem-solving needs. (p. 99)
>
> . . . .
>
> [The] term resource management system includes all methods and procedures for collecting and processing information on a particular resource (i.e., men, money, machines, or what is germane to our subject here, information itself) and formating that data in a manner which is useful for management.

. . . .

[We would] include under this definition of information resources all personnel information systems, payroll information systems inventory information systems, program management information systems, marketing information systems, manufacturing information systems, and so on. (p. 100)

Landau, 1979:

> For approximately the last 15 years, a growing body of analysis techniques, often referred to as management information systems (MIS), has developed primarily around the specifics of computer functions and capabilities, but also utilizing contemporary system theory, decision processes approach, and modeling techniques. In a sense, the information resources management (IRM) approach is an outgrowth of the MIS activities. However, it addresses a much broader panorama of information and how it is handled. (p. 10)
>
> . . . .
>
> The major information management functions can be established by taking the following steps: (1) identify all information resources of the organization; (2) develop organization-wide policies, procedures and guidelines; (3) initiate appropriate organizational readjustment procedures; (4) set priorities of requirements; (5) establish standards and guidelines for definition, measurement, use, and disposition of information; (6) coordinate development of tools of management of information resources; (7) create necessary training, educational and career progression opportunities for information specialists.
>
> . . . .
>
> Figure 2 lists the various major organizational elements and activities which relate to information handling. (p. 11)
>
> . . . .

FIGURE 1

INFORMATION

PROCESSES	FUNCTIONAL ACTIVITIES
Creation	Word Processing Programs
Organization	Computers, Data Banks & Information Systems
Storage	Records, Programs and Depositories
Retrieval	Reports Control and Inventories
Transmission	Statistical Programs and Data
Display	Paperwork Management Correspondence, Files, Forms, Directives, etc
Maintenance	Libraries and Information Centers
	Printing and Reprographic Programs
	Microform Programs

INFORMATION TECHNOLOGY/ DISCIPLINE MATRIX

TECHNOLOGIES	DISCIPLINES
Publishing	Information Science
Printing	Library Science
Replication	Management and System Sciences
Computers	Mathematics and Statistics
Communication	
Micrographics	

FIGURE 2

ILLUSTRATIVE DATA HANDLING ORGANIZATIONS AND ACTIVITIES

ORGANIZATIONS WHICH ARE "DATA HANDLING" IN CHARACTER

1. Computer Centers
2. Printing and Reproduction Services
3. Mailrooms and Message Centers
4. Libraries and Information Analysis Centers
5. Reports Control Offices
6. Communication and Telecommunication Centers
7. Statistical Services
8. Record Centers and Repositories
9. Clearinghouses and Information Referral Centers
10. Data Centers and Documentation Centers
11. Paperwork Management Offices

ACTIVITIES WHICH ARE "DATA HANDLING" IN NATURE

1. Design and Development of Information Systems Statistical Data Systems, Data Bases and Statistical Series
2. Records Creation, Maintenance and Disposition
3. Reports Creations, Maintenance and Processing
4. Data Base Management
5. Development and Maintenance of Directives and Instructional Materials
6. Development and Maintenance of Training and Educational Materials
7. Docket and Dossier Creation, Maintenance and Disposition
8. Stenographic and Court Reporting in creating records which are printed and filed (e.g., Administrative, Legal, Medical, Financial)

(p. 11)

Lewis, 1980:

> The organisational changes which I see in ICI [all information units, libraries and report centers] are therefore to do with the decentralisation, fragmentation and decrease in identification of any coherent information function. Information units/libraries which traditionally have emerged blinking into the light from the womb of the Research Department, are now middle-aged entities which are increasingly being 'adopted' by new parents--patents departments, management services departments, 'administrattion' and planning departments. (p. 68)
>
> . . . .
>
> The opportunities [for information management] lie in the following areas:
> - Training,
> - Marketing,
> - Intelligence,
> - Systems design,
> - Information brokerage.
>
> . . . .
>
> Training involves the intelligent imparting and receiving of knowledge, and who better to do that than the good 'information professional'?
>
> . . . .
>
> Teaching the user to operate modern systems effectively must become an intrinsic part of the function of the information unit. Ultimately, of course, this will result in the user becoming entirely self-sufficient, thereby making the information officer/librarian suplus to his requirements--an irony not lost on us! (p. 70)
>
> . . . .
>
> [The] marketing of the information resource . . . is akin to the training and education function, but I see it as requiring a much more aggressive stance. The need is to acquire a missionary zeal which drives the IO on to carry the message to all corners of the organisation.
>
> . . . .
>
> The present position of many information staff relative to their users, and their detailed awareness of users' needs must make them particularly suitable for work on advanced systems design. It is difficult to see what opportunities for information staff will be apparent in the future, but what will probably happen will be that a substantial percentage of those who would today have taken up carrers as information staff will become systems designers. (p. 71)

Smith, 1980:

> In the case of information work, the credibility of the various branches of the profession depends on several of the characteristics [of professional activity] described. Librarianship is mature enough to have become accepted as a profession but suffers [from] . . . some uncertainty. . . . This uncertainty is more pronounced in the case of information science, ... (p. 11)

There do seem to be special difficulties in defining a relevant body of knowledge for information science because of its close connections with the practices of the specific clientele using the professional services provided. There is a greater need for these practices to be understood by information workers than is the case for other professionals. (pp. 11-12)

. . . .

[There] are two aspects of systems thinking to consider: the management of information as a product and the functions of information within institutions and society.

. . . .

The management aspect is usually taken to be the chief concern of the information profession, ... (p. 67)

. . . .

We shall introduce a basic model for the purposes of comparison.

Figure 5

(p. 69)

. . . .

If, however, we wish to show the relationships between systems, another form of model is required in place of this simple picture of information transfer. (p. 69)

7.13. Conjunctional Definitions about Objects and People: To mechanize

Kent, 1961:

The ability to record information on magnetic tape, punched cards,and punched tape, and to produce copies of these media automatically and at low cost represents a revolution in the documentation field as significant and with as far-reaching consequences as those of the invention of printing. Thus is provided the opportunity to establish a new type of library, or a new aspect of traditional librarianship, which will make possible the collection and storage of analyzed and encoded published literature in a form ready for mechanized exploitation. The new types of libraries will be the customers of, or subscribers to, the centralized processing of this "machine feed." This centralized processing agency will acquire, analyze, and encode the scientific literature received from the entire world. (p. 236)

Shera, 1962a:

> Because librarians have been largely indifferent to the opportunities offered by innovations in modern science and its associated technologies, new aspects of the bibliographic process (known variously as documentation, information retrieval, and information science) have been permitted to grow up independent of librarianship, and in the popular mind, the routines followed by librarians bear no relation to these intellectually exciting developments. The information scientists ignore the solid foundation evolved by librarians over centuries of experience and the librarians reject as irrelevant to their profession the experimental work now being done in unconventional methods of information handling, with the result that the wasteful and dangerous schism in what should be a natural professional identity continues to widen.
>
> . . . .
>
> It is immaterial to society whether its thirst for recorded knowledge is quenched by librarians or by some new professional breed, but it should be a matter of great concern to the profession which, by virtue of its accumulated knowledge and experience, is in the strongest position of all to minister to society's information needs. (p. 4486)

Hayes, 1964:

> [Information science] has very broad meaning, encompassing the foundations not only of libraries but of business information systems, technical information systems, socio-economic data banks, and military command and control systems as well. Information science is most closely related to librarianship because of the traditional concern of librarianship with the more or less mechanical processes of information handling. (p. 52)

Shera, 1965:

> On this side of the Atlantic, however, documentation made little impact upon librarianship until the 1930's, and even the word was largely interpreted in terms of photographic, especially microphotographic, processes and techniques.
>
> . . . .
>
> It was the Second World War and the need for rapid and precise access to masses of intelligence data that focussed attention upon unconventional methods of bibliographic organization and information analysis. (p. 33)

Shera, 1968b:

> However, because the most vocal and influential members of the institute [American Documentation Institute, in the 1930's and 1940's] were deeply concerned with new methods of photographic reproduction, especially microfilm, documentation on this side of the Atlantic soon became virtually synonymous with microphotography, just as in Europe it was closely associated with the promotion of the Universal Decimal Classification. (pp. 58-59)

. . . .
Over the years, the conflict in which the documentalist-information specialists would rather fight than switch engendered more emotional heat than intellectual enlightenment. The phenomena is especially interesting to the student of the sociology of professionalization as an example of the desire of an alien group to change the terminology of the invaded, and thus present at least the outward manifestations of a new discipline. Changing the terminology, it was believed, changed the character of the practice; 'descriptors' somehow endowed 'subject headings' with scientific respectability and made them acceptable in good society. (p. 60)

Schur, 1973:

> In our view, large areas of modern librarianship and areas in data processing are included in the field of the information specialist. (pp. 7-8)

Kimble, 1975:

> In this book we will view computer science as one branch of a group of information sciences. These include communication (in the sense of both lingusitics and electrical engineering), cybernetics (that is, feedback control and automation in general), and library science. All these are unified by a certain technical concept of <u>information</u> and by the <u>computer</u> itself. (p. v)
> . . . .
> The ramifications of library science have evolved to such a degree that some authors identify the more technical aspects as the subfield <u>information science</u>. In the view of this book, library science is <u>one</u> of the information sciences. (footnote, p. 50)

Elman, 1976:

> Information science and the new technology of the electronic computer have made their impact in spite of the reluctance and skepticism of many librarians. Scientists, and especially information scientists, became convinced that librarianship, particularly information retrieval, was too important to be left to the primarily humanistic librarians, . . . (p. 422)
> . . . .
> Let us plead for humanization at the level of the pragmatic working information scientists and librarians who must deal with the daily human aspects of information and its seekers. (p. 423)
> . . . .
> In the last two decades the profession has witnessed the exhiliration [<u>sic</u>] of unparalleled rapid growth of information science and librarianship. (p. 425)

Saracevic, 1977:

> Historically, the first courses, as far as I have been able to find out from the history of information science education, were offered, I believe, in 1955 by James W. Perry and Allen Kent on machine literature searching. (p. 27)

Halm, 1978:

> In the USA information science became the accepted term for non-conventional librarianship, because of the growth of specialized organizations concerned with the "new librarianship", e.g., documentation within certain disciplines and the use of computers and computerized information services. (p. 13)

8. Conjunctional Definitions about Kind of Domain

(not classified into sub-categories)

Josephson, 1912:

> Special methods are used in its [the special library's] administration. Documentation will be largely employed. . . . The classification must be much closer [than in a general library] and in cataloging less attention need be given to the bibliographical description than to the contents. . . . Furthermore, the special library is to a much larger extent than the general dependent upon material that has not yet reached printed form, manuscripts, letters, tabulated material, all this and many other different means of information will be collected and arranged for future use in special libraries. (p. 158 in Johnson, 1915)

Godet, 1939:

> The working distinction between libraries and centers of documentation is, we see, in reality, far from clear. The difference is generally less apparent in the things themselves than in a certain spirit, in the attitude of the functionary who as "documentalist" is influenced more by utiliarian concerns, and as traditional librarian more by cultural interests.
>
> Whatever all these distinctions may amount to, it is plain that in the documentation movement there is a wide gap between the theory and the practice, between the program and the actual situation. (p. 190)
>
> . . . .
>
> In theory documentation covers everything. In reality it is a one-sided, very recent movement, which merely serves to accentuate, to round out, or to extend at certain points the universal and ageless activities of libraires. (p. 191)

Berthold, 1940:

> American lack of sympathy with the concept of documentation is due to the largely theoretical interests of many of its exponents and to the over-emphasis on certain limited aspects of the subject: namely, promotion of the Universal Decimal Classification and microphotography. Examination of the publications of the International

> Federation for Documentation shows that European documentalists have precisely the same interests as American librarians. While we, however, treat these subjects from the point of view of specialists in documentary techniques, they deal with them as users of the materials. To be complete, documentation must be international. In order to achieve this aim it must pass thru three stages: recording and classification of research materials, coordination and standardization of documentary processes on a national scale, and extension of these activities on an international scale. (p. 896 in Library Literature, 1940-1942)

Morley and others, 1950:

> In England, the special library is often called an "information bureau" and the special organization librarian an "information officer", or a "documentalist", as in Europe. (p. 20)

Egan and Shera, 1952:

> Bibliography is, or should be, a carrier system for ideas and information analogous to a well-articulated railroad system for the transportation of physical commodities. (p. 18)
>
> . . .
>
> Bibliography must be looked upon as being, in effect, the roadbed over which the units of graphic communication move among the various parts of society as they make their contribution to the shaping of societal structure, policy, and action. (p. 19)
>
> . . . .
>
> Philosophers have long speculated about knowledge itself--the sources and methods of knowledge, its limits and its validity--but the study of epistemology has always revolved about the intellectual processes of the individual. Psychologists carried the philosophers' speculations into the laboratory and have made some progress in studying certain aspects of the mental abilities and behavior of the individual. Neither epistemologists nor psychologists have attempted to develop an orderly and comprehensive body of knowledge concerning intellectual differentiation and integration within a complex social structure. (p. 26)
>
> . . . .
>
> The sociologists, though they have directed their attention toward the behavior of men in groups, have emphasized basic emotional drives and motivations and have paid scant heed to the intellectual forces shaping social structures. . . . One is forced to conclude, then, that a new discipline must be created that will provide a framework for the effective investigation of the whole complex problem of the intellectual processes of society. . . .
>
> Such a discipline is here denominated, for want of a more accurately descriptive term, 'social epistemology', by which is meant the study of those processes by which society as a whole seeks to achieve a perceptive or understanding relation to the total environment--physical, psychological, and intellectual. The derivation of the term is readily apparent. Epistemology is the

> theory or science of the methods and foundations of knowledge, especially with reference to the limits and validity of knowledge; and through it the philosopher seeks an understanding of how the individual achieves a perceptual or knowing relationship to his environment. Social epistemology merely lifts the discipline from the intellectual life of the individual to that of the society, nation, or culture. (p. 27)

Shera, 1952:

> For half a century special librarianship and documentation have coexisted as separate, even disparate, manifestations of general library practice. At times their paths have crossed and recrossed, run parallel, or diverged sharply, yet every attempt to describe or define their relation to each other or to identify their place in the parent discipline of librarianship itself has been conspicuously unsuccessful. In large measure this failure to comprehend the essential unity of documentation and special librarianship as the focus of more general library objectives may be explained in terms of historic development, of nationality of origin, or of excessive restriction in the definition of function. (p. 189)
>
> . . . .
>
> It is important to note that in the beginning documentation was very narrowly interpreted by the founding group as being restricted almost entirely to the promotion of new methods of photographic reproduction; . . . (p. 193)

Shera and Egan, 1953:

> That librarianship and documentation are a unity is the major thesis of this introductory statement. Admittedly, in recent decades, documentation and librarianship have tended to separate. . . . The documentalists have not seen that their operations were founded in the practice of librarianship, and have been unwilling to profit from the errors and achievements of their colleagues in the library field. (p. 22)

Shera, 1954:

> Thus emerges a need for a new discipline, or science, of communication. This will emphatically not be a reworking of the old area of mass communication with which we have become, it must be admitted, rather tediously familiar. We are concerned here with a body of knowledge about knowledge itself. How knowledge has developed and has been augmented has long been a subject of study, but how knowledge is coordinated and integrated and put to work is yet an almost unrecognized field of investigation. . . . But neither epistemologists nor psychologists have developed an orderly and comprehensive body of knowledge concerning intellectual differentiation and the integration of knowledge within a complex <u>social</u> structure. The sociologists, though they have directed their attention toward the behavior of men in groups, have paid scant heed to the <u>intellectual forces</u> shaping social structures.

> The new discipline that we here envisage, and which for want of a better name, we have called 'social epistemology', will provide a framework for the effective investigation of the whole complex problem of the intellectual processes of society--a study by which society as a whole seeks to achieve a perceptive or understanding relation to the total environment. It will lift the study of intellectual life from that of the individual to an inquiry into the means by which a society, nation, or culture achieves an understanding relationship with the totality of the environment, and its focus will be upon the production, flow, integration, and consumption of all forms of communication throughout the entire social pattern. From such a discipline should emerge a new body of knowledge about, and a new synthesis of the interaction between, knowledge and social activity. (p. 7)
>
> . . . .
>
> The profession of librarianship, of course, lies at the very vortex of such a discipline, for the library is probably the oldest and perhaps the most effective mechanism for facilitating this interaction between the individual and graphic records. Furthermore, the steadily mounting body of recorded knowledge, and the increasing specialization of all forms of social action have, of necessity, brought the library into intimate contact with a wide variety of social organizations and institutions--government, industry, commerical enterprise--that cannot function without the constant interaction of new knowledge with the activities that they carry out and the decisions that their management must make. The librarian therefore is in particular need of more knowledge than is available today concerning this relation between between recorded information and social dynamics. (p. 9)

Egan, 1956:

> Clearly, the library is part of the general communication system, and any effective theory of librarianship will have to be related to the evolving theory of communication in general. Mass communication, however, might be described as declarative, whereas library services are interrogative communication. . . . In library service, the dynamics are reversed. The recipient, although he may be stimulated through promotional activities, initiates a request for a certain message or type of message, and the librarian must then find, somewhere in the total body of recorded communication, the particular message or type of message requested. Current communication theory has nothing to say about this type of communication problem, . . . (p. 205)

Shera, 1956a:

> But neither epistemologists nor psychologists has developed an orderly and comprehensive body of knowledge concerning intellectual differentiation and the integration of knowledge within a complex social structure. The sociologists, though they have directed their attention toward the behavior of men in groups, have paid scant heed to the intellectual forces shaping social structures.

> The new discipline that we here envisage, and which for want of a better name we have called "social epistemology," will provide a framework for the effective investigation of the whole complex problem of the intellectual processes of society--a study by which society as a whole seeks to achieve a perceptive or understanding relationship with the totality of the environment, and its focus will be upon the production, flow, integration, and consumption of all forms of communication throughout the entire social pattern. From such a discipline should emerge a new body of knowledge about, and a new synthesis of the interaction between, knowledge and social activity. (p. 8)

Bjorkbom, 1959:

> The "real" librarians regarded Otlet as an outsider and an ignorant fantast (see e.g. P. Schwenke's report of the Brussels meeting in Zentralblatt für Bibliothekswesen 1910). Nor were the special librarians officially accepted as real librarians. It is quite understandable that these outsiders should unite. There was from the very beginning a deep gulf between librarianship and documentation which was not to be bridged till much later. (p. 68)

Jackson, 1961:

> A special library is engaged in activities serving the technical information needs of a special clientele which departs from standard library procedures and uses nonconventional sources and methods as necessary to fill those needs. Like documentation, it is an active not a passive service. In 1961 it differs from documentation by requiring a lesser level of subject matter competence and by a tendency to use existing literature and sources. The trends . . . will show that by 1980 it will be impossible to distinguish between a special library and a documentation service. (p. 209)

Shera, 1961:

> As the need for information drives the individual, so also it drives societies. It is the basis of collective, as well as individual, behavior. As the brain deteriorates when deprived of information, so a society, if it is to avoid decay, must make constant provision for the acquisition and assimilation of new information. (p. 13)
>
> . . . .
>
> Culture, then, is a duality of action and thought, bound together by the communication processes. Action in a culture corresponds to the biological processes of the human body, and derives from the fact that men--not man--inhabit the earth. Thought (or scholarship) is to be understood as the totality of the verified, or at least generally accepted, body of knowledge and beliefs that inheres in the culture. . . . Since scholarship and action are correlative, the atomization of the one engenders

> conflicts in the other, and the ultimate breakdown of a society can be averted only through the exercise of some powerful cohesive force. That force can be exerted by the communication system.
>
> Thus emerges the need for a new discipline, perhaps a science of communication. This is not to be understood as a plea for a reworking of the old field of mass communication, or even for more communication studies, so-called, with which the language arts have recently been identified. We are here concerned with an epistemological discipline, a body of knowledge about knowledge itself. The manner in which knowledge has developed and has been augmented has long been a subject of study, but the ways in which knowledge is coordinated, integrated, and put to work is, as yet, an almost unrecognized field for investigation. (p. 15)
>
> . . . .
>
> The new discipline that we here envisage (and which, for want of a better name, we have called social epistemology) should provide a framework for the effective investigation of the entire complex problem of the intellectual processes of society--a study by which society as a whole seeks a perceptive relation to its total environment. It should lift the study of intellectual life from that of a scrutiny of the individual to an inquiry into the means by which a society, nation, or culture achieves understanding of the totality of stimuli which act upon it. The focus of this new discipline will be upon the production, flow, integration, and consumption of all forms of communicated thought throughout the entire social pattern. From such a discipline should emerge a new body of knowledge about, and a new synthesis of, the interaction between knowledge and social activity. (p. 16)

Hattery, 1962:

> In the field of science information, we are faced with confusion in terminology. Librarianship, documentation, science information, technical information, science communication are all used to identify areas of concern which may be identical, partially duplicative or exclusive depending on the user of the term and the situation.
>
> Not only does the obfuscative practice of inexact and unstandardized terminology make communication difficult--it also tends to insulate against detailed probes into the nature of operational science communication. (p. 10)

Harlow, 1963:

> The librarian provides the basic structure of the information system, having a general understanding of the whole operation and holding it together. His responsibility embraces all aspects of information work--intellectual, bibliographic, mechanical, and administrative. . . .
>
> . . . .
>
> His primary responsibility is to apply judgment to library situations, based upon an integrated knowledge of the objectives, principles, techniques, materials, and users of library service.

. . . .

A special librarian is a librarian with two well developed specializations, librarianship and the literature of a subject field, with responsibility to a highly conscious audience and a resulting emphasis upon use.

. . . .

I shall revive here and use the word documentalist to include those having special competence in dealing with the machine--for storing, searching, reproducing, and transmitting information. (p. 504)

. . . .

Joined to this unbeatable team of librarians is the literature analyst, primarily trained in a subject field, with an above average knowledge for a scientist, of the character and content of the literature within his scope. As a scientist, he works at a desk rather than a bench, and his function is to search, organize, evaluate, and synthesize information, whatever is appropriate in relation to a given program of research, and he may be responsible for the final report. He is the middleman between the librarian or information expert and the scientist or scholar, not taking over the function of either (including their personal reading) but bearing the major responsibility for research and synthesis in respect to recorded knowledge. (pp. 504-505)

. . . .

The information scientist is included here to dispel confusion, for he is not part of an information system. He must be fully qualified in one or more of a variety of subject areas and intent upon research in some aspect of information--its nature, handling, storage, search, communication, or use. Like the chemist, physicist, and economist, he uses information and extends knowledge, but he is not part of the communications pattern.

. . . .

We have now identified five general classifications in the information field--librarian, special librarian, documentalist, literature analyst, and information scientist--although these are not necessarily all (there being programmers and code developers, for example, working with the machine), nor are they always operationally discrete (a special librarian often doubling as documentalist). (p. 505)

Hayes, 1964:

In a very real sense, it is the concept of system design which has come to represent the revolution--it is probably teh crucial concept in the theory and application of "information science." It is my personal belief that information science will become an integral part of library education, that it will become an increasingly important part of the librarian's professional and operational responsibility, and that it represents the theoretical, if not scientific, foundation of librarianship. (p. 51)

. . . .

I have said that system design is the crucial concept in information science. What then is "information science"; how does it differ from "information technology" and "library science"; how does it differ from "information specialty"? As I have said, it is a theoretical discipline, one which is concerned with the application of mathematics, system design, and other theoretical

concepts to formalization of the processes in handling information. It is concerned with information technology but is in no sense identical with it. . . .(pp. 51-52) However, information technology--computers, micro-recording, communication systems--has represented the catalyst and made it so important to develop now the concepts of information science. On the other hand, "library science" has become almost completely identified with a specific type of information system and is, I feel, highly oriented toward the operational particulars of existing libraries. If this view is valid, then information science is the theoretical discipline of librarianship and library science is the professional one. . . . I use the term "information specialist" to describe someone concerned with the operational utilization of a particular information system to meet the needs of the people served by it.

. . . .

[Information science] has very broad meaning, encompassing the foundations not only of libraries but of business information systems, technical information systems, socio-economic data banks, and military command and control systems as well. Information science is most closely related to librarianship because of the traditional concern of librarianship with the more or less mechanical processes of information handling. (p. 52)

Mohrhardt, 1964:

At a recent meeting of the International Federation for Documentation, the Soviet representative stated that we now must recognize three elements in our science programs: basic science, technology and documentation (science information).

. . . .

Lacking an authoritative lexicon, even such publications as the White House report Science, Government, and Information [1963] use the terms scientific documentation, technical librarianship, information scientists or librarians, documentalists, technical communication systems, scientific communication process, and information centers. The terminology is redundant and confusing, but it is used typically in this inexact manner. (p. 743)

. . . .

The universe which includes documentation can be visualized as a group of overlapping, interrelated, but [con]centric circles. Table I illustrates two views of the relationships of documentation, communication sciences, librarianship, data centers and information centers. View A represents my concept of their relative positions while view B presents the dedicated documentalist's concept.

. . . .

The basic core of these disciplines is communication sciences (or information sciences). (p. 744)

. . . .

Librarianship a century ago had a universal meaning: assembling, organizing and servicing collections of books. (pp. 745-746)

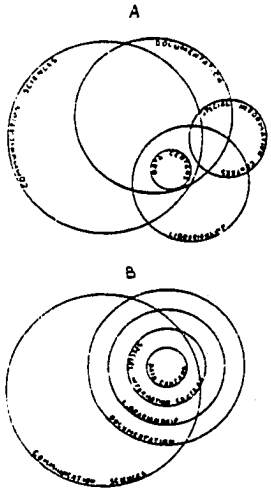
. . . .

It should be noted that during the twentieth century the term library has become so general in its scope that it attains specificity and meaning only when it uses a modifying term. . . . [The many kinds of libraries] show the fragmentation of what was, a hundred years ago, a discrete discipline.

. . . .

European librarians, with long-established collections of books and with firmly-rooted institutions, continued their traditional cultural approach to libraries as collectors and preservers of books. The new, dynamic trend toward what became known as documentation established itself around what were then called bibiliographic centers. By contrast, in the United States, these new and special needs were recognized as related to librarianship, and what was termed documentation in Europe became known here as special librarianship. (p. 746)

. . . .



(p. 744)

Shera, 1964:

I am not entirely clear as to exactly what an information scientist does, but apparently he conducts research into the character of information, especially scientific information, and the ways in which people, especially scientists, use information. (p. 2)

. . . .

The information scientists, for some reason, happen now to be primarily mathematicians. . . . Thus they look upon information science and systems development in terms of mathematical models, equations, and all the other esoterica of their craft. (p. 3)

. . . .

Librarianship, information science, and the science of information handling are, I think, truly interdisciplinary. They are the most interdisciplinary of all the disciplines.

. . . .

The problem of information and how it is used involves the whole spectrum of man's behavior. It involves the operation of the brain, the neurological response, and it involves, of course, as we have seen, certain mathematical expressions. It involves the dissemination of knowledge, information, through society--what I have called social epistemology for want of a better term. (p. 4)

Slamecka and Taube, 1964:

> We are concerned with the problem of discerning, assimilating, and putting to work judiciously the knowledge gained by those with whom we share, at least in part, common objectives but differ in the application of methods and techniques. (p. 66)

Kotani and Ito, 1965:

> [Documentation work] is the extension of librarianship, especially the services in the special or research library should be the documentation work itself. . . . [The] documentalist is nothing but the special or research librarian, provided that he emerge [sic] traditional librarianship and acquire more intensive academic knowledge in his specialized field and the modern techniques of information science. (p. 55)
>
> . . . .
>
> "Information scientist" is one who studies and develops the science of information storage and retrieval, who devises new approaches to the information problem, and who is interested in information in and of itself. This is a completely distinct type of information specialist whose concern is with information per se rather than with information ad hoc. (p. 56)

Licklider, 1965:

> The "libraries" of the phrase, "libraries of the future," may not be very much like present-day libraries, and the term "library," rooted in "book," is not truly appropriate to the kind of system on which the study focused. We delimited the scope of the study, almost at the outset, to functions, classes of information, and domains of knowledge in which the items of basic interest are not the print or paper, and not the words and sentences themselves--but the facts, concepts, principles, and ideas that lie behind the visible and tangible aspects of documents. The criterion question for the delimitation was: "Can it be rephrased without significant loss?" Thus we delimited the scope to include only "transformable information." Works of art are clearly beyond that scope, for they suffer even from reproduction. Works of literature are beyond it also, though not so far. Within the scope lie secondary parts of art and literature, most of history, medicine, and law, and almost all of science, technology, and the records of business and government. (pp. 1-2)
>
> . . . .
>
> The remoteness of the planning target date . . . freed us to concentrate upon what man would like the nature of his interaction with knowledge to be. That is possibly an important freedom, for extrapolation of the main courses of present-day library science and information technology does not lead to concepts or systems that seem either very desirable or very effective. (p. 3)
>
> . . . .
>
> If books are intrinsically less than satisfactory for the storage, organization, retrieval, and display of information, then libraries of books are bound to be less than satisfactory also. (p. 5)

. . . .

The second concept of a library, according to Marill [1963], is one in which the primary function is to provide not documents but informatin. The "system" of the second concept will be able to "read" and "comprehend" the documents themselves and not merely their [index] tags. It will have a high capability for organizing the information internally.

It will be able to accept questions worded in natural English. If it has the requisite information available, it will answer the questions in natural English. Thus Marill advocates a very sophisticated procognitive system. (p. 153)

Shera, 1965:

The history of disputation over documentation is almost as long as that over special librarianship, and with the emergence of other specially denominated breeds of librarians, the confusion has become compounded.

. . . .

Western Reserve [University School of Library Science] has consistently held to the conviction that documentation and information science are an integral part of the totality of librarianship, . . .

. . . .

[By] the early 1960's the terms librarian, documentalist, and information specialist, and their variants, were becoming badly confused. (p. 34)

. . . .

[There] was general acceptance [at the 1962 conference at Georgia Institute of Technology] of the definition of an information scientist as one who engages in research into the theory and practice of information handling.

. . . .

One result of the Atlanta conferences was to stimulate in schools of engineering an interest in the training of information scientists. (p. 35)

. . . .

The present writer is convinced that information is the librarian's business and that he is the one person who, by virtue of his historic role and social responsibilities, is best qualified to become a specialist in the emerging information-related studies. (p. 36)

Shera, 1965a:

We are, therefore, here concerned with the need for a new epistemological discipline, a body of new knowledge about knowledge itself. The manner in which knowledge has developed and has been augmented has long been a subject of study, but the ways in which knowledge is coordinated, integrated, and put to work is, as yet, an almost unrecognized field for investigation. (p. 8)

. . . .

The new discipline that is here envisaged (and which, for want of a better name, has been called social epistemology) should provide a framework for the investigation of the entire complex problem of the nature of the intellectual process in society--a

> study of the ways in which society as a whole achieves a perceptive relation to its total environment. It should lift the study of intellectual life from that of a scrutiny of the individual to an inquiry into the means by which a society, nation, or culture achieves understanding of the totality of stimuli which act upon it. The focus of this new discipline should be upon the production, flow, integration, and consumption of all forms of communicated thought throughout the entire social fabric. From such a discipline should emerge a new body of knowledge about, and a new system of, the interaction between knowledge and social activity. (pp. 8-9)
>
> . . . .
>
> If the librarian's bibliographic and information systems are to be structured to conform as closely as possible to man's uses of recorded knowledge, the theoretical foundations of his profession must eventually provide answers to such questions as:
>
> The problem of cognition--how man knows.
>
> The problem of social cognition--the ways in which society knows and the nature of the socio-psychological system by means of which personal knowledge becomes social knowledge.
>
> The problem of the history and philosophy of knowledge as they have evolved through time and in variant cultures.
>
> The problem of existing bibliographic mechanisms and systems and the extent to which they are in congruence with the realities of the communication process and the findings of epistemological inquiry. (pp. 9-10)
>
> . . . .
>
> The study of the process by which a culture, a society, or a group collectively achieves a state of knowing is what is here meant by social epistemology. (p. 13)
>
> . . . .
>
> [To] say that system is the essence of the science of librarianship states a very narrow and restricted view. The study of social epistemology, which is in reality the study of social cognition, is the proper foundation of the science of librarianship. (p. 24)

Shera, 1965b:

> The study of the ways in which a society achieves an understanding relationship with its environment is what Margaret Egan called 'social epistemology', and it is fundamental to a theory of librarianship. (p. 241)
>
> . . . .
>
> Thus, as graphic records came into being in response to the need of society for a medium that would communicate messages essential to the operation of the social structure, to religious doctrine or ritual, or to any other activity in which the members of the society might engage, so there arose the demand for an agency to control such of those records as needed, for any reason whatever, to be preserved. From the very beginning, libraries have always been an integral part of the 'business' of operating a society, hence a legitimate collective concern. As the culture matured and became more sophisticated, its dependence upon graphic records

> increased, and changes in the culture were reflected in the librarian's responsibilities. (p. 242)
>
> . . . .
>
> What happens within that psycho-physiological process that take place when a human mind confronts a library store or the bibliographic tools that are intended to be the key to it? How does the knowledge that the individual assimilates become a part of the collective intelligence of a culture? How is social behaviour influenced by the knowledge that society absorbs? These are the basic problems that confront the librarian and should guide his professional practice. . . . In the largest sense, the proper study of librarianship is man. (p. 243)

Slamecka, 1965:

> There has been in recent years a sharp increase in the awareness of "information" as something very general, fundamental, and perhaps intrinsic to organic existence. This concept of information as a phenomenon of the biological universe applies at the level of the conscious mind (as when permitting communication, or learning), as it does at the apparently non-conscious level (for example, when "causing" heredity). Within this unified context, the study of the nature and properties of information is the subject of information science. (p. 15)
>
> . . . .
>
> [The] subject matter of information science is of such a nature that it cannot very well be fitted into the programs of any of the traditional academic departments. This is particularly true about the departments and programs of librarianship whose non-mathematical orientation is not easily adaptable to that of information science.
>
> Despite the dichotomy of orientation between information science and present-day librarianship, both fields will continue to affect each other. The methods of information control and use, as developed by librarianship and documentation, are of much theoretical and practical interest to information science, while librarians may look to information science for a better understanding of subject analysis, classification methods, intensification of user services, and the like. But information science is not synonymous with mechanization of library technical services, and the library school courses in documentation and data processing . . . do not make librarianship synonymous with information science.
>
> The impact of information science does not lie in rendering the librarian (or the manager, the teacher, the general [sic], etc.) obsolete, nor in making him an information scientist; it lies in the opportunity for librarianship to assume new functions. Information science will, without doubt, lead to a deeper and better understanding of information, its value, utility, and handling, and it will increase the effectiveness of information in education, management, and particularly in problem solving. (p. 18)

Swank, 1965:

> Third is the emergence of additional, exacting specializations in librarianship, especially in the area of information science, including operations resaerch, systems analysis, and mechanization. We now have information specialists and information scientists in addition to science librarians and just plain librarians. And I wonder why we never called ourselves "library scientists". The exact nature and the manpower needs of these specializations are still poorly defined, but it is clear that they do involve additional functions and interests and that they do require the methodologies of other subject fields. (pp. 2-3)
>
> . . . .
>
> And fourth is the development of librarianship itself as a more rigorous discipline. The growing complexity of the profession requires the discovery and application of more precise methodologies for the study of library affairs. In other words, a still more exact science of librarianship is imperative, . . . (p. 3)

Cuadra, 1966:

> One need only look at current educational programs in "information science" to find eloquent testimony to the problems of defining the field of interest. Some workers see it as a somewhat glorified, even overblown version of conventional library practice. Some, taking the computer as their intellectual base of operations, view information science in terms of machine manipulations of linguistic, pictorial, or even only numeric data. Others, some of whom call themselves documentalists, view the field as neither library science nor computer operations but as a fairly distinct discipline dealing largely with the processing and/or analysis of scientific and technical documents. A small minority, many of them newcomers to the information field, view the activities they see in terms of interpersonal communication. To them, the field is a behavioral one, for which both computer and document handling methods are important but limited aspects. In contradistinction to these (and other) somewhat limiting points of view, many workers are now beginning to argue that Information Science and Technology is not synonymous with any one of the fields or points of view outlined above. Rather they see it as a new--if still amorphous--area of inquiry and invention with historical antecedents in and technical debts to these and other fields, including even such apparently nonrelevant ones as business data processing and military command/control systems. (p. 2)

Donohue, 1966:

> Librarianship possesses a long-established corpus of knowledge relating to a science of information. Librarians, traditionally service-oriented rather than research-oriented, have not exploited that body of knowledge for general principles of IS [information science].
>
> . . . .
>
> Information science is frequently confused with science information. For the purpose of the study science information

> courses . . . are those that (like science librarianship) are concerned with the techniques of information handling as applied to science. Information science, on the other hand is, to use Taylor's [1964] definition: The study of the properties, behavior, and flow of information. It includes
> (1) environmental aspects of information and communication,
> (2) information and language analysis,
> (3) the organization of information,
> (4) man-system relationships. (p. 120)

Taylor, 1966:

> The term "documentation" is used in this discussion of non-U.S. work because it has a common meaning internationally. A documentalist is considered to be something of a special librarian, with a strong scientific or technical specialization, or, in the terminology of this paper, a science information specialist. (footnote, p. 29)

Farradane, 1967:

> Many people regard, perhaps correctly, the area of librarianship and information work as one broad spectrum; nevertheless, the spectrum is so wide that the two ends can be seen to be very different; the rapid growth of new activities in information science is continually extending that end of the spectrum, and even in the centre . . . the differences in approach to what are nominally the same subjects, e.g. classification, call for different methods of education. (p. 11)
> . . . .
> At its end of the spectrum, librarianship traditionally starts with custodianship, organization of compilations of information (primarily books), cataloguing and service to readers to guide them to such literature. . . . Nevertheless, librarianship has very largely failed to develop the capacity to deal with the urgent modern needs of industry, government and other organizations where, in particular, scientific and technical needs predominate. There are many possible reasons for this: perhaps a predominant reason is that librarianship has primarily concerned itself with the literature, in the concrete form of books and journals, and not with the information to be extracted from such literature; it has also tended to disregard live sources of information such as organizations which can provide know-how, and individual experts who can impart personal knowledge. There has been, and still is, a bias towards the historical aspects of information, . . . There has been a tendency to treat information as synonymous with bibliography. There has also been conservatism in essential techniques; . . .
> . . . .
> The need for information work has arisen almost entirely in the fields of science and technology, though there is a gradually increasing demand for work on economic information, and no doubt there will be developments in the social science fields in the near future. To deal competently with information, especially for any evaluative capacity, adequate subject knowledge, especially a broad knowledge extending over several subjects, is essential; . . .

. . . .

Where the available courses are only enhanced librarianship, or documentation courses, it does not appear that advanced levels of information work are being attained.

. . . .

There is no doubt of the importance and urgency of dealing with all the problems of handling information, and of the rapid development of new techniques, especially computer techniques, and of linguistic, logical, and semantic studies, so that high levels of competence in information science will increasingly be needed. (p. 16)

Harvey, 1967:

Pushing its [information science's] borders further into other fields should enable it to attract higher caliber personnel than did, for example, library science after its shrinkage from the social sciences made it less a science and more a vocation. (p. 421)

Rees and Riccio, 1967:

Research in Information Science has been considered by many educators as esoteric and irrelevant to the practice of librarianship. Library research, such as it exists, reveals a striking reluctance to utilize the research methodologies of other disciplines. If research in librarianship is to flourish it must be interdisciplinary in nature. For this reason it is most probable that information science will absorb library research considering the reluctance of library schools to foster a scientific and experimental approach.

. . . .

[Very little teaching effort is concentrated] in research, that is, in information science in the strict sense. (p. 36)

Slamecka and Zunde, 1967:

Furthermore, by accepting the concept 'information'--in all its forms--as the central concern of this field it follows that systems for the control and use of records (documents) are a subset of a broader range of 'information systems'. Indeed, current practice bears this proposition out: document control is increasingly being viewed (and designed) as a component or subsystem of control systems. The latter appear in the form of corporate information systems, hospital information systems, systems for regional economic planning, military command/control systems, educational information systems, and so on.

. . . .

The two dominant concepts, or denominators, of information engineering are 'information' and 'systems'. The theoretical foundations of this field will therefore comprise the fields of information science and systems theory; its applied content comprises the component operations and their analysis.

Information science is concerned with the study of the nature of information and the laws which govern its generation, organization, processing (transformation and transmission), and utilization. (p. 51)

Tell, 1967:

> If a course for documentalists (in the following this word should be read as synonymous to librarians) is to be taught as a college education, . . . the student acquires a 'know-how' in librarianship as in any other professional education. (p. 202)

Horn, 1968:

> Despite [many efforts] . . . to clarify and urge agreement upon definitions of such terms as librarianship or library science, special librarianship, documentation, information science, information engineering or technology, science information, etc. there remains a tendency for individuals and organizations to use whatever terms appeal to them in describing, identifying, or differentiating their own efforts or programs. . . . . In both Britain and the United States there is a lamentable tendency to confuse the work of the information scientist with that of the information officer or information specialist engaged in the fields of science (i.e., science information, not information science) and technology. Although the term "documentation has been long used in both Britain . . . and the United States . . . in both countries the work of the special librarian is closely equivalent to the work of the documentalist in Europe. (p. 284)
>
> In the United States and elsewhere there is still considerable disagreement as to whether information science is a part of librarianship, whether librarianship is a part of information science, whether information science is a separate discipline closely related to librarianship with several areas of overlapping concern, or whether information science is the body of theory and systems analysis which undergirds the applied efforts of such practitioners as librarians, information specialists, and documentalists. To some persons, information scientists seem so preoccupied with computers that they really are in the field of computer science. In the opinion of others, information scientists are so preoccupied with classification and the organization of recorded information that they are really in the field of documentation. (pp. 284-285)
>
> . . . .
>
> Our experience suggests that a separate degree in information science is actually a very good way, albeit at times a rather painful one, to achieve the desired integration between the "old" (librarianship and bibliography) and the "new" (documentation and information science). (p. 292)

Nitecki, 1968:

> The distinction between the documentalist and the librarian is one of degree, rather than of kind. The documentalist, considered as a special librarian, is interested more directly in information theory than in the general theory of librarianship. Since the similarities between the two orientations far outweigh the differences, the line of demarcation is somewhat thin, differentiating perhaps between the two meanings of "information": (1) as an act of informing, and (2) as a state of being informed. The proper subject

for study in the act of informing is discourse, i.e., the study of form and structure, excluding the consideration of the function of the information flow. . . . The state of being informed, on the other hand, implies a functional effect of the act of informing; the object of the study is to analyze the relevance of the information flow in the resulting performance of, or the impact on, the reader. (pp. 371-372)

Ranganathan, 1968:

It has been shown that documentation service is intensive reference service with emphasis on nascent micro documents and service to the specialist. (p. 158)

. . . .

Documentalists form an important section of librarians. In fact, documentation is the highest reach of library service attained till now. (p. 160)

Saracevic and Rees, 1968:

Librarianship is neither science, nor art, nor occupation, although it has elements of all three. Some professional characteristics are present, in that librarianship exists in order to satisfy a social need; . . . Most important, a significant proportion of its professional practice has a base in theory which is, and should continue to be, derived from scientific research work conducted either inside or outside of the profession. It is through these last two characteristics, technology and theory, that a link exists between librarianship and information science. (p. 4098)

. . . .

It is our contention that information science might very well be able to supply a theoretical basis to librarianship. Information science should, and to a large extent does, supply research that has potential implications for innovation in librarianship. The work in information science which is oriented toward problems related to representing, organizing, storing, and disseminating graphic records is obviously closest to librarianship. (pp. 4098-4099)

. . . .

In the long run,it remains to be seen whether information science can have more success in researching library problems than previous or sociological approaches.

. . . .

Lacking any substantial theoretical basis, what has been the major source of innovation and change in librarianship within the past few decades? The major source has been information processing technology--not any science related work. . . . Technology has crept into librarianship, and especially into special librarianship, as a result of information retrieval and its European cousin, documentation. Both of these activities are technologies in the strictest sense of the word, with considerable effort spent in development, with minimal attention paid to what can be termed applied science, and still less to basic science.

The strictly engineering approach to library problems has, of course, an immediate return. However, serious limitations exist with

> respect to such an approach. . . . [In] order to determine how information systems and libraries operate, how they interact with their environment, how they fit in the total communication network both formal and informal, how their structures and functions are comparable, why and where they succeed or fail, what the next steps should be before systems are changed--an approach is needed that only a <u>science</u> can provide in support of engineering.
> . . . .
> It is obvious that an almost total gap exists at present between information science and library practice. Unless this gap is closed there is little hope for serious innovation in librarianship beyond sporadic attempts at the application of gadgetry. The successful practice profession demands a thorough knowledge of the content of a significant portion of modern science. (p. 4099)
> . . . .
> The need for formulating and formalizing a theoretical framework of libraries and library processes is apparent.
> . . . .
> A profession, such as librarianship, cannot live by technology alone. . . . Paralized by decades of philosophical and literary argumentation, librarianship has much to gain from information science. The insights, tools, and methodologies of mathematics, logic, statistics, linguistics, system analysis, behavioral sciences, etc., have much to offer to librarianship. Flippantly, it is possible to suggest that we have tried formal philosophy, sociology, and technology, so why not try science? (p. 4100)

Schur and Saunders, 1968:

> In the area of education and training . . . [the] intention of most is frequently clouded by terminological difficulties. While acknowledging the near-impossibility of precision, . . . [to] save the wearisome repetition of "scientific and technological library and information work" (or worker) we have, for convenience, used the expression "science information" to include both library and information work. (p. 4)
> . . . .
> We would endorse the view . . . that as yet no discrete, generally accepted body of knowledge can be identified as being "Information Science" or "information Technology". . . . Until such a time [as it is produced] we must accommodate to an interdisciplinary situation. (p. 51)

Shera, 1968:

> <u>Special Librarianship</u> was never a very felicitous term anyway. It seems to have been plucked from the air by John Cotton Dana, who apparently was searching for some form of tag that would identify library service to the technical needs of a burgeoning American industrial community. The term never really "said" anything, and we would shed few tears over its demise. But we cannot bring ourselves to feel the same indifference about <u>documentation</u>, even though no one has ever been able really to define it in a way that would elicit consensus from those who employed it. (p. 135)

> The use of the term, as related to a form of bibliographic activity, seems to have originated with Paul Otlet who, like Dana, was reaching for a descriptive noun that would differentiate his concerns from conventional librarianship as it was understood in Europe at the close of the nineteenth century. Otlet defined documentation as "a process by which are brought together, classified, and distributed all the documents of all kinds of all the areas of human activity," a definition that would seem to fit librarianship equally well.
>
> . . . .
>
> We ourselves formerly maintained that it is that portion of bibliographic organization which relates to the communication of recorded information within and among scholarly groups; . . . Today we would give the term a considerably broader area of meaning, but would certainly not go as far as Suzanne Briet who wrote in her famous treatise Qu'est-ce la Documentation? [sic] that "les animaux catalogués et exposés dans un Zoo" qualify as documentation, a point of view that aroused mirth among the fraternity despite Mme. Briet's deservedly distinguished reputation as a scholar and the obviously simian attributes of some documentalists. (p. 136)
>
> . . . .
>
> So documentation, with all its history, richness, and connotative subtlety is now passé, and in its place we have a synthetic hybrid called information science, which, as Rabbit would say, is sure to be a science because of calling it a science. (p. 138)

Shera, 1968a:

> Since libraries are agencies for the diffusion of cultural products, the theory and practice of librarianship must be founded upon what I call social epistemology--the study of social knowledge, the means whereby society as a whole achieves a perceptive relation to its total environment, the totality of the stimuli that act upon a society, nation, or culture, with specific reference to the production, flow, integration, and consumption of all forms of communicated thought through the entire social fabric. Social epistemology is of particular importance to the librarian, because he stands at the point where recorded knowledge and social action meet and his concern is with what Kenneth Boulding has called the transcript (whether written or not) of the culture and the impact of that transcript upon--again to borrow Boulding's term--the image, that which man believes to be true, which largely determines and directs his individual and group behavior. (p. 314)
>
> . . . .
>
> Because of the emerging "science of information," librarianship is, for the first time in its long history, being compelled to formulate selfconsciously its role in society, to examine critically its intellectual foundations, and to view itself holistically, as an integrated system that serves man, both as an individual and as a member of society, throughout his life. (p. 316)

Shera, 1968b:

> When the furor over documentation was at its height, someone whose name regrettably has not come down to posterity defined the term as 'librarianship practiced by amateurs'. (p. 60)
>
> . . . .
>
> But the meaning of documentation poses a problem that is now virtually academic, for in the United States of America, at least, it has come to be regarded as being even more obsolete than librarianship, even by many of those who a few years earlier were its most ardent advocates and practitioners.
>
> . . . .
>
> But the term [information theory] is attractive, and those concerned with improving access to recorded knowledge were not slow in seizing upon it for their own purposes. Thus information science soon became the accepted term for non-conventional librarianship. (p. 62)
>
> . . . .
>
> Information science, then, is not antithetical to librarianship; on the contrary, the two are natural allies, and librarians should not reject this new intellectual relative, nor should the information scientist discredit the librarian. . . . For the moment at least the librarian and the information scientist may speak with different tongues--new concepts require a new terminology--but eventually a consensus and a common understanding will be achieved. Rees, Saracevic and Taylor are all symptomatic of a new generation of librarians, a generation that can lead librarianship back to the scholar-librarian. He will be a new kind of scholar-librarian (the scholarship will be totally different from that of the Ancients) but he will be able to give the profession the intellectual enrichment and depth for which it has for so many years been searching. (p. 65)

Artandi, 1969:

> If we think in terms of environments which are relevant to information science and technology, the library emerges as one of the more important ones, and librarians emerge as a professional group that is becoming increasingly involved in information science and technology. . . . This trend becomes even more evident if we avoid the mistake of considering information science and technology as synonymous with computer applications. (p. 337)
>
> . . . .
>
> A number of fundamental concepts [of information science and technology] cut across library school curricula, and . . . can be grouped in the following broad categories:
>
> 1. the processes involved in communication, the nature and behavior of information, the theory of document organization and of data organization, patterns of information transfer and existing formal and informal information systems in the broad sense of the word, methods of research, and problems of computer manipulation of text for such purposes as indexing, abstracting, translation, and querying;
>
> 2. the general concept of systems, their behavior, design, and operation, the study of systems in terms of their efficiency

and their value to the users, the point of view which leads to the analysis of needs and situations prior to action and to the clear-cut definitions of objectives;

3. the relevance and the potential of computers to the field, as well as their limitations, thinking which will lead to informed judgments concerning the application of computers in a variety of situations. (p. 338)

Leslie, 1969:

[Instead] of librarianship and documentation we now tend to emphasize library science and information science, which somehow seem to be very much alike. . . [The] real trend is the steady movement toward unity in overall professional interest.

. . . .

Both the computer specialist and the practicing librarian are concerned with many problems completely outside the realm of information science as we define it today. (p. 78)

Mikhailov, Chernyi and Gilyarevskii, 1969:

Information activities of scientists have always been associated with libraries whose workers helped scientists in the selection of pertinent literature, made them aware of new accessions and provided them with requisite materials. It is for these reasons that for thousands of years libraries have been the only social institution that accumulated and generalized the experience of information services to such a specific category of readers as scientists. This valuable experience has been reflected in library science and bibliography. However, radical changes that have taken place over the last 50-70 years have called for the organization of information services to scientists and specialists on a completely new basis. (p. 20)

. . . .

The information activities, too, have underwent qualitative changes, having by far exceeded the limits of routine library bibliographic work involving only the traditional means of information dissemination such as books, periodicals and the like. These developments were well understood by the prominent Belgian scientist P. Otlet as far back as the beginning of this century, who separated from library bibliographical activities all processes associated with the collection, processing, storage, retrieval and dissemination of documents to united them under the general name of "documentation". At present this term is regarded as a synonym of "informatics", although informatics studies the laws governing all forms of information activities, as well as their theory, history, methodology, and organization, rather than the documentary activities only. (pp. 20-21)

Thus informatics is in a way a continuation of bibliography and library science, but the experience inherited by informatics from these branches of science is being subjected to complete reappraisal and appears in a new quality.

> Although a recently born discipline, informatics has already developed a number of radically new methods and means of scientific information services unknown to library science and bibliography. These include coordinate indexing, descriptor information retrieval languages and thesauri, inverted files, uniterm cards and peek-a-boo punch cards, KWIC-type and alphabetical correlative indexes, citation indexes, etc. Informatics deals with some aspects of recording and dissemination of scientific information, while library science and bibliography have never even posed such questions.
>
> As regards library science and bibliography, they continue to develop and specialize on the elaboration of more efficient procedures and organization of work with readers; on the solution of problems of long-term storage of literature; on the development of procedures for prompt provision of readers with requested literature; on improving principles of cataloguing; as well as on various aspects of theory, history, methodology and organization of library and bibliographical services. (p. 21)

Ostrowska, 1969:

> The aim of this Guide is to present the fullest up-to-date details about the training facilities in documentation and information work in the World.
>
> . . . .
>
> The collected material was collated and edited according to principles laid down by the FID [International Federation for Documentation] Training Committee, so that only data relating to the formal training of documentalists, information workers, and special librarians are included. In general, information about courses in traditional librarianship . . . has been excluded from the Guide; . . . (p. 9)

Penland, 1969:

> Information science looks at documents and their contents as a method for promoting and controlling knowledge growth and development. As such, the document serves the literature scientist as a source and a base in his quest for knowledge synthesis and condensation. In communications research on the other hand the document and its contents constitute a message upon which interpretive analyses may be made and inferences drawn about the source, the audience, or the socio-cultural and political environment.
>
> In both instances, however, the close relationship to library science is clearly obvious. Library science has nurtured both document analysis and control and the use of content in its variant forms. Historically, library science has sponsored both the disciplines of information science and communication. Today they remain interdependent. But it is precisely on the question of what functional purpose content serves that distinguishes information science from communication. And as one might suspect their answers to this question also reveal a dependency upon their parent discipline. (p. 480)

Shera and McFarland, 1969:

> Rather, information science provides the intellectual and theoretical base for the librarian's operations. The two fields are halves of a whole. (p. 441)
>
> . . . .
>
> Moreover, information science, whatever its dimensions, is--at least in the United States--basically research oriented, whereas librarianship is not. Because information science is only incidentally service directed, its practitioners are not concerned with proving that such service as they might render meets the standards of professionalism set by the lawyer, the doctor, or the minister; the information scientist takes his professionalism for granted. (p. 444)

American Library Association, 1970:

> Library service as here understood is concerned with knowledge and information in their several forms--their identification, selection, acquisition, preservation, organization, communication and interpretation, and with assistance in their use.
>
> . . . .
>
> [The] library occupation is much broader than that segment of it which is the library profession, . . . (p. 1)
>
> . . . .
>
> Throughout this statement, wherever the term "librarianship" is used, it is meant to be read in its broadest sense as encompassing the relevant concepts of information science and documentation; wherever the term "libraries" is used, the current models of media centers, learning centers, educational resources centers, information, documentation, and referral centers are also assumed. (footnote, p. 1)
>
> . . . .
>
> Certain interdisciplinary concepts (information science is an example) are so intimately related to the basic concepts underlying library service that they properly become a part of the library school curriculum rather than simply an outside specialty. (p. 7)

Benge, 1970:

> [Librarianship] has become increasingly specialised. Various groups devise slogans for banners of their own and, unless restrained, begin to march away in all directions. (p. 223)
>
> . . . .
>
> In many countries there are people working in libraries who call themselves documentalists and not librarians. (p. 228)
>
> . . . .
>
> There is a difference of degree, that is all.
>
> The divergence between the two fields is not unconnected with the two cultures problem, and it was only natural that workers in special libraries should feel that the techniques in general librarianship which had developed in the later part of the nineteenth century were not relevant to their modern needs.

. . . .
[In] most European countries . . . 'general' librarianship was . . . rooted in the humanities. . . . (p. 229)
. . . .
Special librarianship and documentation involve . . . specialised techniques which come firmly within the sphere of librarianship, . . . (p. 230)
. . . .
The modern emphasis on the importance of information has transformed librarianship as a practical activity and as a theoretical discipline. The most obvious evidence is the growth of the special library movement, particularly in the scientific and technical field. This has led to the creation of 'documentation' services, which involve specialist subject knowledge and the interpretation of literature by information officers. (p. 235)

Boldis, 1970:

[Informatics] is a scientific discipline concerned with the complex study of the essence of specific scientific information systems with the aim to enhance the temporal and qualitative effectiveness of the scientific-informative process. Part of informatics consists in its sub-systems such as librarianship theory, library science, theory of bibliography, theory of documentation, theory of the systems concerned with the conservation and retrieval of information. In this conception informatics has an integrational function in the field of theoretical disciplines which deal with various kinds of information and information systems; in this, however, each discipline preserves its own particular independence, specific position and function. (p. 4)
. . . .
If information, systems of communication in society and people are considered to be the objective nucleus of informatics, one is fully entitled to state that informatics has essentially a social-scientific character and belongs to the system of social sciences. (p. 5)

Foskett, 1970:

The responsibility for this [future organizational patterns at the subject, national, and international levels] lies on the shoulders of librarians, information officers, information scientists--all, that is, who would lay claim to be specialists in the new discipline of 'Informatics'. (p. 365)

Mason, 1970:

[In the diagram] the smallest circle in the middle is labelled "information science". It represents that study of information systems to which I have already referred. The next circle outwards . . . represents basic research into information science. The next circle . . . represents applied research and development, that is to say those aspects of basic research which are being studied to see how they can influence and affect practice, and also includes those aspects of practice which have developed on traditional lines and need studying to discover the basic principles which lie behind them. The final circle . . . represents

information practice. It is separated into five segments, each of which stands for a particular information service activity in the main flow cycle of recorded information.

. . . .

The primary segment represents the generation of new knowledge, ... The associated activity, with which we are concerned, is usually referred to as "information support", in that trained information staff work alongside the research scientists, attempt to understand their problems and assess their needs, and support them by finding, supplying, and helping to exploit relevant infc.mation. (p. 309)

. . . .

The next segment represents the recording and publication of the new knowledge. The scientist himself is usually involved in writing up the results of his own work. The information activity lies in such work as the editing of reports and papers, and in technical writing which correlates a range of research activities and presents them in a form suitable for management, or perhaps customers, or sometimes even the non-scientific public.

. . . .

In the next segment we have a straightforward information and/or library activity: the selection, acquisition and storage of the documents and other media which contain the recorded and published knowledge.

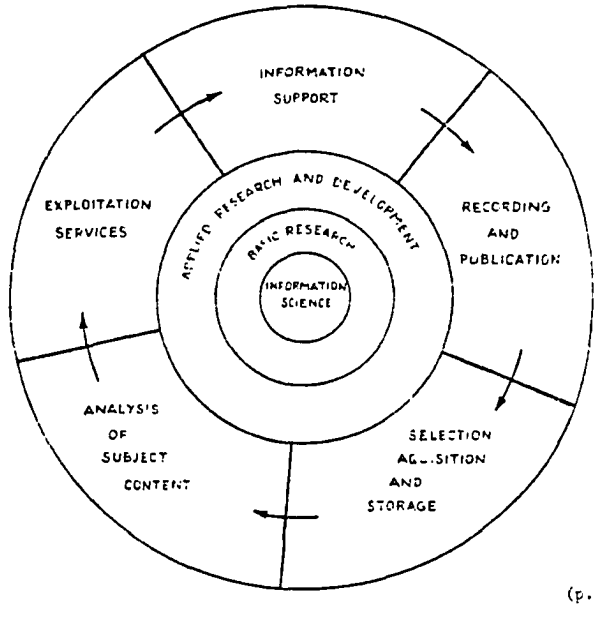
. . . .

The fourth segment represents the analysis of the subject content of the documents and the preparation of retrieval devices in order to recover the recorded knowledge on demand; . . . .

. . . .

[With] such small numbers involved . . . can those who are concerned really afford to continue the fiction that there are two separate professions? (p. 311)

. . . .



(p. 310)

Otten and Debons, 1970:

> [We] anticipate the evolution of a metascience of information in response to the need for a critical reevaluation of the foundations upon which many information disciplines and technologies are based. This anticipated metascience can be viewed as the science of information (or informatology). Informatology can be defined as the study of the fundamental principles underlying the structure and use of information. (p. 92)
>
> . . . .
>
> [The] metascience's main contribution is the function it plays in synthesizing the various formalistic descriptions into one unified set of theories which is equally applicable to all contributor sciences and disciplines. There are numerous new disciplines concerned directly with some selected phenomena of information.
>
> . . . .
>
> Computer sciences are concerned with the processing of information, particularly by digital computers. . . . However, the information-oriented problems in computer sciences are centered around computers as processor and are hence specialized. The metascience of information, in contrast, is studying and describing the fundamental concepts of information and operation on information regardless of its main function--its theories must be equally applicable to computers, biological systems, man, social systems and man-made information systems.
>
> . . . .

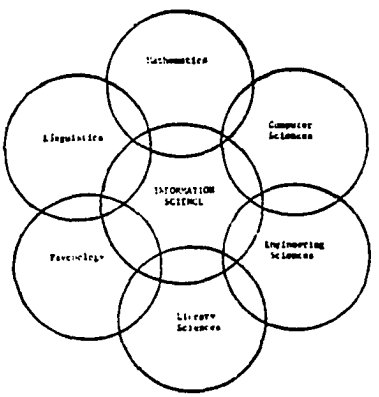


Fig. 1 Information Science and Related Sciences (Schematic two dimensional representation of an n-dimensional relationship—only the most important related sciences are shown)

(p. 93)

> . . . .
>
> Finally, we have to comment on the various forms of "information science" ranging from the narrowly defined library and documentation science concepts to the all-inclusive claims for an information science. Information science, in the sense of documentation and library science, is oriented toward one sector of the postulated metascience: the laws of classification and of mass information storage and retrieval. To date, this library-oriented information science has been preoccupied with developing improvements of documented message handling and has not been able to devote much effort toward the study of the laws underlying these operations. Therefore, information science in the library science sense represents primarily a technology, with some science-oriented aspects that can be considered as sub-fields of the postulated metascience. (p. 94)

Forino, 1971:

As is well known there have been (and there still are) two main approaches, particularly in the U.S.A., to information science.

The first one is centred on library science which sometimes has been considered as encompassing information science, sometimes as included in it. The second approach is centred instead on computer science, considered as the general science of information-processing technologies and methodologies.

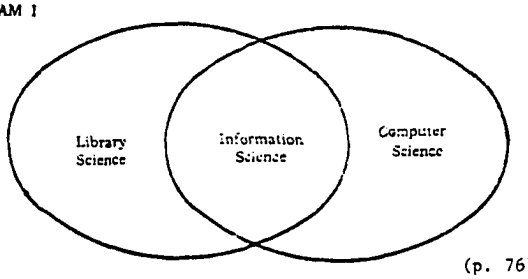
By recognizing the basic role that documentation plays in all sectors and the growing importance of automation in library administration and documentation technologies, we are led to consider these two approaches as complementary, rather than antithetic.

According to this view library science and computer science appear as two largely overlapping areas, of which the intersection may be defined as the central core of information science. We can characterize this central core as including all items concerned with the structure and properties of information-handling systems and devices.

This can be illustrated by the following diagram that shows that information science can be considered either as a composite discipline corresponding to the common intersection of library and computer science, or else as an independent discipline which is basic to both fields.

. . . .

DIAGRAM I



(p. 76)

. . . .

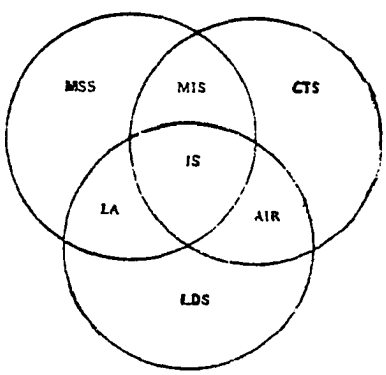
According to a more recent view a third area should be taken into consideration: i.e. management and systems science. (p. 76)

. . . .

We are thus led to consider information science, as shown in Diagram 2 as the common intersection of three large areas:
LDS: Library and documentation sciences,
CTS: Computer and telecommunication sciences,
MSS: Management and system sciences. (p. 77)

. . . .

DIAGRAM II



. . . .

As previously remarked information science is not only a discipline of a composite nature, but is also basic to all other disciplines and areas of activity.

We can illustrate this by reference to the following . . . which shows information science (considered here with its three main constituents: library and documentation, computers, management and systems sciences) as an independent discipline intersecting all other disciplines, which are grouped here for convenience in five major sectors:

a. natural sciences
b. engineering
c. human and social sciences
d. liberal arts
e. information sciences.

. . . .

[Information science] technologies and methodologies are a universal element with respect to all other disciplines, including its own. (p. 79)

Malan, 1971:

After Joan Tighe of Australia had reviewed the new ASLIB [Association of Special Libraries and Information Bureaux] curriculum for the education of subject information specialists, she said "...if all this is an information officer, an information officer is a special librarian".

By all this we do not wish to aver that a new profession is not developing or possibly already exists, nor that it has no right of existence, but merely that the emphasis on differences rather than on similarities cause an artificial gap which will be difficult . . . to bridge.

. . . .

Seldom before in the history of library services, has there been a period of such Babelonian confusion as now exists in connection with the terminology concerning information science. The reason for this confusion lies in the uncertainty about the scope of information science. Objectives, functions and criteria await formulation, and until this is done, the Tower of Babel will continue to collapse over the confusion of terms. (p. 248)

. . . .

In England, for example, this worker is usually, but not always, an <u>information officer</u>, on the continent of Europe he is a <u>documentalist</u> and in the United States an <u>information scientist</u>. This confusion in terminology arises mainly from differences in interpretation about the nature of the activities rather than from lack of specific terms. (p. 249)

Parker, 1971:

Communication insitutions, whether newspapers, libraries, broadcasting companies or telephone companies, share with other institutions the need for people who can operate effectively within the existing institutional framework. (p. 50)

. . . .

Librarians share with journalists, photographers, film-makers, broadcasters and computer programmers the need to be able to effectively operate or manipulate their chosen technology or medium of communication. (p. 52)

. . . .

Although the analogies have yet to be formalized into an abstract theory of information, there are interesting similarities between machine information processing in computer systems, cognitive information processing in humans (biological systems), and human communication in social systems. All three aspects are involved in the development of information systems. Better understanding of the fundamental processes would be certain to lead to improved system design. (p. 57)

. . . .

All three of these components of effective information systems development--technology, human behavior, and social institutions--will require the acquisition of new knowledge as well as application of old knowledge. The problem is a mission-oriented one of accomplishing social goals, rather than a pure knowledge problem, but new knowledge is essential to satisfactorily accomplish the social goals of improved information service. Therefore, a strong component of information science, as a basic science, should be included in curricula planned for information technologists.

. . . .

The nature of information and information processes may be the fundamental focus of science for the next century, just as science in the past two centuries has focussed on matter and energy. (p. 56)

. . . .

The problems of information are so fundamental and cut across so many present disciplinary boundaries that it is nearly impossible to find an academic department within existing university structures in which to pursue a fundamental theory of information without being constrained by the assumptions of a particular discipline or profession. (p. 58)

Penland, 1971:

It is only recently that information science has helped librarianship to return from the "slough of despondency" over the failure of its preoccupation with the humanities to initiate and maintain viable social policies that would guide the widespread use of information in sociopolitical and economic decision-making. The humanities are the forte of the individual and help him in making personal decisions and in leading the good life. But the humanities are of questionable value in making practical policy decisions for groups and communities. The individual librarian and information specialist may continue to profit from a personal study of the humanities, but leadership in providing information for a wide variety of socioeconomic and political problems will increasingly be a function of policies based on carefully researched scientific findings.

. . . .

[Communications science] has based its approach on the cybernetic functions of the adaptive control organism with considerable success. Of course, the great systems of human thought have contained some concept of what man is. However, for the purposes of communication science, man is the sum of those ideas and observations that have been submitted to the test of scientific evidence. Man is defined as the sum of systematically collected and empirically measured bits and pieces of scientific evidence. (p. 451)

. . . .

In librarianship, the lack of commitment to and deep appreciation of the social and in particular the policy sciences has delayed the development of a communications science, the mobilization of interlibrary resources, and the application of information to the socioeconomic and political problems of policy decision-makers. (p. 452)

. . . .

Together, library and information sciences are working to bring about the good life of complete knowledge and information control. Library science has added substantially to the feasibility of a world encyclopedia, while information science, employing general systems theory and the cybernetic model of communication, is developing a theoretical framework in which to incorporate the isomorphies among the subject disciplines and the professions.

. . . .

Message acqusition, storage, and control remain the basic functions of library science. Information science facilitates data transportation by increasing not only access points, but also the syndetic structure so that an individual, as Ashby [1958] says, can enter the retrieval system at any point and be led to any point he may wish to go.

. . . .

The early marginal annotations of texts, as for example those of Roger Bacon on Duns Scotus, have today grown into a major endeavor which includes indexing and classification. Such textual glosses may be considered the historical root of information science. On the other hand, John Dury the English librarian found it necessary to call attention to lacunae in recorded knowledge and persuade subject specialists to do research and publish in these areas. This endeavor may be considered the foundation of the social responsibility of the library profession. (p. 459)

Shank, 1971:

It is difficult to know just who has moved towards whom, but I would suggest that elements of both topical areas [information science and librarianship] have enlarged towards each other. Information science has been good for librarianship--it has provided it with a construct for generalization of what librarianship and its elements are. (p. 173)

Stone, 1971:

Now speaking to information scientists, librarians and others who work or choose to identify themselves as specialists

in the field . . . internecine warfare among branches of your profession must be terminated. (p. 273)

. . . .

In short, what to date we have usually called the information science arts, crafts, technologies, name them as you will, are coming to approximate engineering services by the time they reach consumer groups. (p. 275)

Wersig, 1971:

Documentary work has been done since the beginning of this century--as a branch of practical work. But as the tasks grew, technology became more complicated and the information needs of the users widened and changed. The need for a scientific discipline covering this field became obvious. Since about 1961 in the USA the term "information science" has been used to denote this growing branch of knowledge and research; since about 1966 the term "informatics" has come into use in the socialist countries. Within this discipline or branch traditional library science still existed and some years later started to discover the aspect of information, too.

. . . .

[There] are some sciences and branches of research which are centred around the effect approach to information, which are interested in the specific effects of messages reducing uncertainty. . . . [They] may be characterized as more socially or behaviourally-oriented, because they are interested in the effects on human individuals arising from concrete social conditions. To name some of these disciplines:

- a discipline we call "information and documentation science", as it was first done in the German Democratic Republic. This discipline is concerned with the study of scientific and technical information systems. It is nearly identical with the "informatics" of the socialist countries and some narrow interpretations of "information science" in the Anglo-American countries. (p. 347)
- library science as the discipline concerned with information systems including libraries.
- archival science as the discipline concerned with information systems including archives.
- mass communication research as the discipline concerned with communication systems trying to inform a mass public.
- psychology of information which is concerned with the psychological factors influencing information processes.
- sociology of information which is concerned with the social factors influencing information processes and systems.
- information technology which is concerned with the problems of the application of technological media in the field of information work.

Some other disciplines may be added, but this is not essential to our problem. All these disciplines are characterized by the fact that they are dealing with information from the aspect of effect, either by studying a certain kind of information system or by studying certain elements of information systems. Since in the solutions of concrete information problem results of all these disciplines are needed and have to be integrated it seems to be appropriate to comprise them under a generic term and to call them "information sciences".

> The information sciences as a whole are concerned with the study and development of the scientific basis of all kinds of information work, including the information work in science and technology. (p. 348)
>
> . . . .
>
> We have to see that the different institutions: archives, libraries, documentation centres, information centres, information anlaysis and evaluation centres, data banks--and occupationa roles: archivists, librarians, documentalists, information specialists, information analysts, information scientists only play different roles in the same game: the game of scientific and technological information. The tasks they are taking over are not contradictory--as it seemed for a long time from the discussions between librarians and documentalists--but are complementary. (p. 350)

American Library Association, 1972:

> Throughout this document, wherever the term "librarianship" is used, it is meant to be interpreted in its broadest sense as encompassing the relevant concepts of information science and documentation. Whenever the term "libraries" is used, the current models of media centers, educational resources centers, information, documentation, and referral centers are also assumed. "Library service" is understood to be concerned with recordable knowledge and information in their several forms--their identification, selection, acquisition, preservation, organization, dissemination, communication and interpretation, and with assistance in their use. (p. 2)

Asheim, 1972:

> A fruitful approach, perhaps, is to think of it [information science] in the present context as being concerned with the scientific foundations of the work of librarians and information specialists. . . . (p. 83)
> [This approach] does lay appropriate emphasis on its all-pervading nature, on the need to integrate it into all relevant aspects of the study of library science. This approach must come out in the librarian's study of the generation of information; its storage and organization (whether in the form of libraries full of books and journals or computer data bases); the associated problems of catalguing, classification, indexing and coding; the control of information, whether by conventional bibliographical means or by computer-based systems; and the design and analysis of systems. (pp. 83-84)
>
> . . . .
>
> The methods of information science, even at their most elementary, call for quantitative attitudes and approaches to library problems and situations; they call for <u>some</u> knowledge, at least, of scientific methods; they call for numeracy, as well as literacy.
>
> . . . .
>
> From what has gone before, it will be clear that the range of knowledge encompassed by library science is wide indeed. . . . In most parts of the world there seems to be fairly general

> agreement that there is such a thing as a basic core of professional knowledge which is essential to a librarian, whatever the type of library, however specialized the activity in which he may ultimately find himself. The practising librarian needs and is required to have basic skills at a general in three areas: bibliography and related subjects, the organization of knowledge, and the administration and management of libraries. (p. 84)
>
> . . . .
>
> The need for research in library and information science is fully accepted in the United States and Great Britain. . . .
>
> . . . .
>
> Full knowledge cannot be claimed of the extent of library and information science research in Canada in general and in its library schools in particular, ... (p. 90)

Dahlberg, 1972:

> Information sciences is understood to denote that branch of knowledge whose objects are information systems and which concerns itself with the methods, processes, characteristics, organization, etc., of or peculiar to such systems. The concept thus includes such fields as archivistics and library science, documentation and information, while also comprising aspects relating to communication and system theory. (quoted by Salton, 1973, p. 218)

Shera, 1972:

> [Documentation] and information science are an integral part of the totality of librarianship, ... (p. 287)
>
> . . . .
>
> [By] the early 1960s the terms librarian, documentalist, and information specialist, and their variants, were becoming badly confused. (p. 288)
>
> . . . .
>
> Librarianship is the generic term and information science is an area of research which draws its substance, methods, and techniques from a variety of disciplines to achieve an understanding of the properties, behavior, and flow of information. Information science is not souped-up librarianship or information retrieval, nor is it antithetical to either. Rather information science contributes to the theoretical and intellectual base for the librarian's operations. (p. 293)
>
> . . . .
>
> Information is the librarian's business and he is the one person who, by virtue of his historic role and social responsibilities, is best qualified to become a specialist in the emerging information-related studies. (p. 294)

Shera, 1972a:

> In 1952 the "new librarianship" was emerging from the maturity of microfilm and pushing on toward the infancy of information science. (p. 785)

. . . .

During this period [of the 1960's] there arose a new kind of librarian, untrained in the conventional library school, but with a scientific or engineering education, who became known as an information specialist. The activities of these information specialists (known in England as information officers] were not generically different from those of the librarian or even the special librarian, though they did represent a broadening and deepening of the information services usually performed at the library reference desk. (p. 786)

. . . .

Slowly the lines of development in librarianship, documentation, and mechanized information retrieval were being intertwined to form the warp and woof of a new tapestry, that of information science, or "informatics," to use the term adopted by Foskett from A.I. Mikhailov of VINITI [All-Union Institute of Scientific and Technical Information], even though the pattern of the new fabric is still indistinct in its major outlines. The origins of this new discipline are generally traced to, or at least associated in a general way with, the work of Shannon and Weaver in information theory and the informaion-carrying capacity of a signal.

. . . .

The neglect of the sociological implications [of the library problem] is surprising for the argument for them is simple and direct--the library as a part of the total communication system in society is an appropriate subject for sociological study; the activity is social, the main elements of the system are social units, and the system is regulated by social norms. The sociology of knowledge has long attraced the attention of philosophers, but the means by which society learns what it knows, the ways in which that knowledge is augmented and disseminated, and the impact of knowledge on social behavior remain virtually unexplored. Such terms as "social epistemology," adopted by the present writer, or "social cognition," perhaps a more appropriate term, were used to identify this field of inquiry, but little progress has been made in its exploration. (p. 788)

Stone, 1972:

> What is the relation of information science to communication and library science? I think the study of communication can reasonably be subsumed by information science. Library science is as different from both areas as is the study of mathematical principles from the use of arithmetic in cost accounting or space navigation. (p. 286)

Sviridov, 1972:

[Information science] encompasses many ideas and concepts from library science, to computer science, systems engineering, statistics, mathematics, logic, linguistics, etc.

Library science has been mentioned as one of the border fields of information science. It is necessary to point out that in

> quite a number of countries of the world documentation and librarianship are considered as two sides of one general profession called in to serve "users" in one case and "readers" in the other. The fact that many universities in various countries . . . have combined the words "information science" (or "documentation") and "library science" indicates that some professional circles see basic unity in what others consider to be quite different areas. The present paper is not intended to discuss both positions. The above-mentioned has been said with one purpose only: to give the author an opportunity to point out the need for close co-operation, especially in developing countries, in training documentalists and librarians. (p. 43)

Wellisch, 1972:

> [100] years ago . . . the all-embracing term for the study of recorded knowledge, its collection, storage, display and dissemination (mostly, though not exclusively, in the form of books) was "Library economy". The term "economy" had then still its original connotation and was used in a sense largely synonymous with present-day "management". There is no doubt, however, that Library economy meant primarily the physical handling of books and other documents in places where these were stored for preservation and possible future use. (p. 159)
>
> . . . .
>
> Towards the end of the 19th century the field of Library economy became gradually known as "Library science", following a popular trend to call almost any human activity that could be studied and about which a certain body of literature had accumulated a "science", . . .
>
> . . . .
>
> Thus, merely changing Library economy to Library science did not, of course, mean that any kind of truly scientific method was applied to the study of libraries, their functions and operation--it merely seemed to librarians that it might do a lot to enhance their status among the professions (not, however, daring to go so far as to call themselves "Library scientists" instead of librarians...). We need not be concerned with this stage in the development of nomenclature in the field of the study of recorded knowledge, because "Library science" does not qualify for the epithet "science". . . . Conversely, however, Librarianship (to call it by its proper and less pretentious name) is certainly one of the primary fields of application of IS [information science], much as chemistry is a science that must be applied to effective waste disposal. (pp. 159-160)
>
> . . . .
>
> The first significant development in the field after Dewey and Cutter was made, both conceptually and terminologically, by Otlet and La Fontaine who founded the Institut international de bibliographie in 1985, to encompass recorded human knowledge, not only as preserved in books but in any kind of document such as in articles, theses and reports and even in largely or entirely non-verbal records such as maps, diagrams and pictures. They stressed particularly the aspect of subject content as being independent of form of presentation, thus breaking away from the unfortunate preoccupation of librarians with physical (and therefore linear) arrangement of documents on shelves. Soon, they began to use the

term "documentation" in their writings, and defined it as

> "a process by which are brought together, classified and distributed all the documents of all kinds of all the areas of human acitivity".

From the late 20s onwards and until the eve of World War II, the study of conceptual as well as physical aspects of recorded knowledge and its utilization (particularly in science and technology) was increasingly referred to as "documentation".

. . . .

In central and western Europe, Documentation is still the official designation for the whole field, i.e., the study of recorded knowledge as well as its physical carriers (documents), . . . (p. 160)

. . . .

[Documentation] in the US came to mean only part of what it meant in Europe--the technology or the hardware, but scarcely ever the conceptual content or the software.

This was probably the reason why a new term "Information retrieval" (IR), first coined by Mooers in 1950, was considered to be necessary and also why it was so eagerly adopted. Although originally meant to signify only the operations necessary to gain access to recorded knowledge irrespective of the form of documentary carriers and aimed at making a distinction between the physical and mental activities that have to be carred out to this effect, the term IR became an "in"-word and again everybody who wanted to be "with-it" talked and wrote about IR, so that the term supplanted "Documentation" almost entirely, and became virtually equivalent to the European idea of "Documentation". (p. 161)

. . . .

[The] term "Scientific information" was sometimes used glibly and indiscriminately as a synonym for ISR. (p. 162)

. . . .

As far as can be ascertained by a fairly exhaustive search of the published literature, the term "Information Science" (IS) was first used in 1959 as a designation for the study of recorded knowledge and its transfer in the widest sense.

. . . .

From 1962 onwards the term IS became firly established in the US and gained rapid acceptance, even though . . . no one was quite sure what it was or whether it was a science at all. (p. 163)

. . . .

During the last five years, several attempts have been made by various writers to propose or suggest alternative names for IS, partly because they had doubts whether the field really merited the name of a "science", but mostly because they thought that if IS indeed was a science, then it should also have a distinctive name of its own, as in the case of the established branches of science. Among the suggestions put forward are:

Documentistics	(Wersig)
Documentology	(Wersig)
Epistemo-dynamics	(Kochen)
Informantics	(Wersig)
Informatistics	(Wersig)
Informatology	(Otten)
Information and documentation science	(Koblitz)

Informology (Wersig)
Social epistemology (Shera)

and maybe other combinations of the stems inform- and document- with various scientifically-sounding suffixes. None of these suggested terms, however, has gained acceptance.

The only successful attempt at new terminology was made by the Russian information specialists Mikhailov, Chernyi and Gilyarevskii who jointly proposed the term "Informatics" in a paper published in Russian in 1966 and translated into English and German in 1967. (p. 176)

. . . .

The name Informatics is now firmly established in the Soviet Union, in East Germany and in many East European countries. In the UK, its adoption was urged as early as 1967 by J. Davies, apparently without much success, but recently the term was again used in a review paper by Foskett [1970] who took it as the title for a survey of the field of information activities and also considers its possible adoption as a name for the discipline in the English-speaking world. (Unfortunately, the names Informatique and Informatik have already been claimed in France and West Germany for the discipline known in English as Computer science--a fact that is now somewhat regretted in both countries; this, however, would not militate against the use of Informatics as a more suitable substitute for IS in English-speaking countries, since Computer science already has a name and is not likely to change it.) (p. 177)

Hershfield, 1973:

[Let] Library Science concentrate on studying human information seeking and processing behavior in different environments, human information needs and the systems whereby those needs are satisfied. (p. 15)

. . . .

[Assuming this approach,] the profession could move a long way toward the elimination of the distinction between librarianship and Information Science. (pp. 16-17)

Moreover, practitioners . . . probably would find a much wider range of employment opportunities open to them than has thus far been the case. They would be information counselors, capable of linking clients with the information (in whatever form) they might require. (p. 17)

. . . .

Personnel identified with . . . [librarianship] tend to have a humanities background while Information Scientists frequently have a strong mathematics and science backgroudn. . . . Libraries and computer-based information systems are separate categories in a single class called "information storage and retrieval systems." While systems falling in either category do differ from one another in many ways, there are some broad areas in which they are similar, if not identical. The differences between library scientists and information scientists, described above, often have led to systems in each category being treated as though they formed two different and distinct classes of phenomena. (footnote, p. 17)

Lancaster, 1973:

> Perhaps one of the best definitions of information science appeared in 1962 in the Proceedings of the Conference on Training Science Information Specialists. . . .
>
> The science that investigates the properties and behavior of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. The processes include the origination, dissemination, collection, organization, storage, retrieval, interpretation and use of information. . . . (p. 122)
>
> . . . .
>
> If we accept these definitions, we could look upon library science as a branch of information science and upon a librarian as one species of information scientist.
>
> However, it may be more accurate to regard librarianship and information science as two areas that impinge one on another. . . . In fact, if we represented these various areas by overlapping circles we would probably recognize a considerable overlap between librarianship and information science, whereas the overlap between librarianship and other fields would be quite slight.
>
> A library is one type of information storage and retrieval system. There are others, including airline reservation systems, command and control systems, management information systems, crime detection systems, and systems for medical diagnosis. The librarian is primarily concerned with one particularly important medium of information transfer, the printed document; and librarianship has traditionally involved the collection, organization, storage, retrieval and dissemination of these documents--in other words, librarians are intimately concerned with documentation. (p. 123)
>
> . . . .
>
> We clarify the role of information science in the library school curriculum if we regard information science as providing a discipline or series of tools applicable to library problems. Giuliano [1969] has proposed that the relationship between information science and librarianship is that between a science on the one hand and a profession on the other. What we should be concerned with is the information science education of the librarian. . . . We must get away from our present "institutional" approach to library education and devote more time and effort to instructing students in methods of information transfer in general. (p. 125)
>
> . . . .
>
> I feel that information science impinges upon librarianship most in the following areas:
>
> 1) Application of modern technology to library problems. . . .
>
> 2) Application of scientific methodologies to library problems. . . . (p. 126)
>
> 3) Current approaches to the design and implementation of information services. This includes modern methods of information storage, retrieval and dissemination, including equipment considerations, indexing and abstracting, construction and use of controlled vocabularies, searching techniques, studies of users and user needs, and evaluation of information services. (p. 127)

. . . .

Finally, we turn to the broad area of information storage and retrieval, which is perhaps the heart of information science as it affects the librarian. While librarians have been concerned with information retrieval for centuries, traditional approaches to storage, retrieval and dissemination problems have tended to break down. Many new approaches to these problems have been developed in the past 25 years, mostly from outside the library profession. Only a decade ago, the librarian was concerned almost exclusively with printed books and journals and with printed indexes to these. (p. 128)

Ranganathan, 1973:

The documentalists claim that they are doing a piece of work totally different from that of librarians. . . . They even invent new names for their 'New Subject' such as 'Information Science' and 'Informatics'. They call themselves 'Information Scientists' in preference to 'Library Scientists'. This creates a self-deception in them. They imagine that changing the label on a bottle necessarily means change in its contents. (p. 65)

. . . .

The self-deception of the Information Scientsts is due to their not having understood the implications of the Five Laws of Library Science, in the setting of the present day society. Their mistake lies in their inability to interpret the term 'Book' in the Five Laws, in the light of the context of today. (pp. 65-66)

Shera, 1973:

We are, therefore, here concerned with the need for a new epistemological discipline, a body of knowledge about knowledge itself. . . . [The] ways in which knowledge is coordinated, integrated, and put to work is, as yet, an almost unrecognized field for investigation. (p. 95)

. . . .

Perhaps no aspect of librarianship has aroused so much interest, not to say curiosity, in the public mind as mechanized information retrieval; and none has been so unproductive. (p. 100)

Taylor, 1973:

Libraries and other information and communication-oriented institutions grew and matured in an educational culture that was information-poor and experience-rich. Our thinking and our planning are based on the assumptions of that cultural context. These are no longer valid. We are now an information-rich and experience-poor culture. (p. 60)

. . . .

What we can do now is plan and develop a base that will allow us to grow and change, without tieing [sic] ourselves to a single insitution (the library) or a single format (the book). (p. 86)

Foskett, 1974a:

> The literature of Library and Information Services (LIS) has not so far been distinguished by its philosophical insights or even by signs of a search for a sound theoretical basis on which to build practice. . . . We can recall the long and still continuing split between 'librarians' and 'information scientists', even though any attempt to delve deeper than the description of individual practices invariably fails to uncover any fundamental difference in aims or objectives. (p. 11)

Koblitz, 1974:

> The difference between the methods of dsecription of information sources as employed by librarianship, on the one hand, and information and documentation, on the other, can be stated in the following simplified way:
> - librarianship informs about information sources;
> - information and documentation informs from information sources. (p. 244)

Reynolds, 1974:

> For in the past decade, at an accelerating rate, there have been dramatic and rigorous research efforts--many with resultant applications--in areas such as classification of information, document retrieval, and data searching, which have traditionally been within the domain of librarians. In spite of the frenzy of redefinition, the term "librarianship" does not encompass this intensifying effort associated with an emerging metascience of information. (p. 583)
> . . . .
> Without attempting a taxonomy of special libraries, I would like to force special librarianship between librarianship and information science. According to my definition, the special librarian is engaged in a library or information center, particularized by a subject or mission, and serving a client who has a fairly well-defined interest. (p. 584)
> . . . .
> [There must be a desire] to change librarianship from a profession in which the librarian occupies a position, performing a set activity, to one in which the librarian is directly involved in the information requirements of a client. (p. 585)

Sergean and McKay, 1974:

> Notwithstanding all these considerations it ought still to be possible to categorize types of library/information work . . . in a systematic way over the whole field of librarianship and information work. . . . (p. 112)
> . . . .
> One reason for this broad coverage is that it permits comparison of work and staffing practices in different branches of the field--public, academic, and special librarianship and information work. (p. 113)

Taylor, 1974:

> Long term [competency] needs will require that professionals be made acquainted with the total information process and that a basic science of information be recognized as a scholarly dis:ipline. (abstract)
>
> . . . .
>
> In this context it is necessary to strengthen the view of the field as a spectrum from services to system design to information science. A student, a professional, or a scientist should be able to see himself along this spectrum, with some understanding of the inter-connectedness of the variety of activities, problems, and educational programs. The dichotomies that are beginning to appear, e.g. between librarians and information scientists, must not be encouraged. (p. 27)

Bramley, 1975:

> The rapid strides which have been made in formulating the theory and the practice of information science has had a number of effects upon the traditional fields of librarianship, with classification and cataloguing being particularly influenced by the emergence of the newer disciplines of information retrieval.(p. 209)
> . . . .
> The emergence of the vigorous young discipline of information science has brought a number of ambiguities in its relationship to librarianship. Is information science merely an off-shoot of librarianship, a completely distinct field of activity, or does it include librarianship as one of its many facets?
> . . . .
> The traditionalists would argue that information science has grown from librarianship, therefore it can, and should, logically be incorporated into the librarianship curriculum. This is in direct contradiction to those who see information science as a completely dissimilar subject to librarianship and therefore requiring a separate course.
>
> The answer would seem to lie somewhere between these two divergent concepts of information science. There are certain aspects of information science which should be taught to any future librarians whatever type of library they intend ultimately to work in. For those who intend to become information specialists the only satisfactory answer to their needs is to offer them an independently structured course. (p. 218)
> . . . .
> A large number of library schools also have information science as an elective course for those who wish to specialise as documentalists, special librarians or information scientists (the titles are not necessarily mutually exclusive). (p. 220)
> . . . .
> [The] actual core subjects of information science [are]: information storage and retrieval systems, data processing and transmission. (p. 221)

Daniel and Mills, 1975:

> The scope of library and information science is taken to be the totality of problems involved in assembling, or otherwise bringing into a system information-carrying media and processing these for dissemination and retrieval.
>
> As with any rapidly developing and cross-disciplinary field, acceptable definition is not easy. In particular, 'information science' is a typically ambiguous construction. We take it to stand for the systematic and scientific study of the problems of information dissemination and retrieval. (section 2, "Introduction")

Larson, 1975:

> By this paper's definition, any person who acquires, catalogues, preserves, and makes available information for a defined constituency belongs to the information managers' profession. This profession is composed of five separate, distinct subprofessions: librarians, archivists, records managers, audiovisual specialists, and information scientists. (p. 5)
>
> . . . .
>
> Until the 1930's the library profession was recognized as primarily responsible for the management of information in the North American countries. (p. 3)

Line, 1975:

> The mystique of librarianship is possibly stronger than its mystery. . . . One of the most pervasive mystifications is the misuse of 'information science', a perfectly good term for the theory and study of information, in the sense of 'practical information work in industry'. (Fortunately, librarians have not yet begun to call themselves 'bibliothecal scientists', . . .) (p. 107)

McGarry, 1975:

> The librarian is also concerned with information science and, of course, information technology; the study of the information seeking behaviour of enquirers, how their questions are framed, and the influence of information on their behaviour. This is still a field of enquiry and endeavour which is in search of a definition. The term 'informatics' has been proposed as 'the systematic study of information transfer'. There is another school of thought which puts forward information science as a social science, since it ultimately deals with human behaviour. (p. 24)
>
> . . . .
>
> Librarianship as a communication science deals with the transmission of information and its ultimate use by human beings; . . . (p. 38)

Gaudron, 1976:

> It could be argued that librarianship is not a profession and there may or may not be some truth in this. Whether libraries will survive then becomes important, and it is linked with whether or not the profession will survive or be supplanted by others (including information scientists). The outcome may depend on which group more correctly interprets the relevance and functions of a library and acts swiftly enough to assert such relevance and employ the functions. It was claimed [by others] . . . that one difference (and implied advantage) information scientists have is that the information they deal with is analyzed and commented on before reaching the client.
> . . . .
> In the case of libraries, the environment encompasses the sum of all the intellectual activities involved in the experience, decoding and utilization of the human environment. (p. 47)
>
> Whether or not information scientists understand or cope with and utilize this particular environment better than librarians seems to be problematical and may ultimately be irrelevant. Even the productive (i.e., constructive) utilization of its elements may not distinguish the two groups. . . . It is the social value of their respective positions which may decide the issue of survival. (pp. 47-48)
> . . . .
> Libraries seem to be, paradoxically, environments and non-environments simultaneously, because they are at once repositories and clearing houses. But in fact they exist to assist in the synthesis of new knowledge by collecting centrally the diverse and unrelated (although all knowledge is finally related) elements which eventually form new disciplines. The danger to their existence lies only in whether they stagnate by reversion to being just repositories. The old concept of the librarian as custodian must be finally subordinated. (p. 48)
> . . . .
>
> If information science exists, it must be capable of refutation--not probably by another, related, science, in this case, library science. Since there are differences between the two professions--for example, a reference librarian and an information scientist do essentially different, but related functions, it would seem that they are capable of simultaneously refuting and reinforcing each other. Such a position would seem to be vital to the survival of both, and of the institutions they serve. . . . [The] co-evolution of the two sciences . . . depends . . . on . . . the recognition that there are some duties which are not shared. (pp. 49, 51)

Lewis, 1976:

> The more advanced units [of information service] are now at this [pro-active] stage. Pro-activity develops from the interactive phase but is distinguished from it by two significant features: (a) Anticipation and critical appraisal--both in terms of information used and also of changes in subject interests and coverage.

(b) Subject specialization--the information staff must specialize in order to be on at least an equal footing with the staff for whom they are providing a service. (pp. 45-46)

. . . .

[Finally] the information specialist is 'absorbed' by the function which he has been servicing. This is not to say that each individual is physically transferred. Rather, I expect that as information unit-based information specialists move out of the more advanced units, they will not be replaced. The information function will then pass to individuals within the line function provided by the user group, whether they be chemists, physicists, engineers or technologists; at a later stage, the information mantle will sit easily on the shoulders of planners, accountants, administrators, business managers, etc. The net effect will be for the information specialist, based on an information unit, to disappear. (p. 46)

. . . .

There will . . . be a continuing need for a limited number of systems designers specialising in information and data processing and provision, for the next 10 or so years and for a smaller number thereafter.

. . . .

Users must be introduced to on-line systems as soon as possible in order that we may study in detail the user/system interface, so as to improve systems design.

. . . .

My major conclusion is that, in the year 2000, with a world-wide communications network available which will provide universal rapid access to the substantial majority of required knowledge, the information scientist and the librarian will have gone the way of the brontosaurus. (p. 49)

Shera, 1976a:

The librarians, too, have denied the importance of a philosophical frame of reference, and as a consequence have never developed a cohesive synthesis of their activities. As a result the movement has become fragmented, with the public, academic, and special librarians, along with the documentalists and information scientists, each group going its own way without any serious understanding of its relationship to the others. (p. 281)

. . . .

We have sought a certain synthesis, too, in our insistence that librarianship is a profession, in a rather naive belief that a term, a simple noun, can give common attributes to an activity that will substitute for a theoretical frame of reference. (p. 282)

. . . .

Perhaps we may now look to the emerging discipline of information science for the philosophical synthesis of the library profession. (p. 286)

Angione, 1977:

Program participants [at the conference on "Education for Information Science--Strategies for Change in Library School Programs" in Albany, 1977] displayed remarkable agreement on

> the matter of its being time--indeed long past time--for us all to end the divisive and obviously semantic discussions of the differences between library science and information science. And--in the interests of unity and progress, one assumes--little discussion and certainly no definitive explication was proffered as to the relationship between the two.
>
> Indeed, program participants quickly laid aside the necessity for any further discussion as to an actual integration process and preferred to speak of the field of "library-and-information-science, all one word," as suggested by Buckland. (p. 33)
>
> . . . .
>
> Library science and information science are no longer at odds. They are not to be represented as component parts, as theory vs. practice, as classical patterns vs. process-oriented systems. (p. 34)

Bottle, 1977:

> Because information science has its roots in the information problems of scientists, its pioneers were scientists who sought to apply scientific methods to structuring the body of knowledge which was accumulating.
>
> . . . .
>
> Information science, like librarianship, has borrowed heavily from other areas, for example mathematics, computer science, sociology, administration, psychology and worse still, it has even borrowed from librarianship. It is therefore not surprising that librarianship and information science curricula can be regarded as two sets of overlapping spectra. The extent of overlap will depend on which sets of electives are taken for comparison; . . .
>
> . . . .
>
> I do not wish to restart the arguments about the precise differences between librarians and information scientists on which so much energy was wasted in the 1960s with so little generation of light. (p. 37)

Brittain, 1977:

> I would like to consider the question 'Is there an activity to do with information, documents, and knowledge transfer that is different from the activities and phenomenon of documentation, linguistics, computer science, psychology, physical sciences, etc.?' (p. 34)
>
> . . . .
>
> Librarianship has been concerned with the acquisition, storage, maintenance, and loan of documents, including the technical aspects of acquisition, processing of documents, library buildings, shelving of documents, issuing, monitoring loan records, and more recently, the prevention of thefts.
>
> . . . .
>
> I suggest that information science has a lot to do with the content of documents and the way in which documents relate to each other, not in terms of classification schemes, but in terms of the way in which authors relate their own works to each other.

As a very rough distinction we can perhaps agree that librarians typically are interested in documents as complete entities; in contrast, users are interested in what is in documents--ideas, data, research findings, and references to other works.

. . . .

If there is such a creature as an information scientist we have to ask what interests him in documents which are neither the domain of the librarian nor the user. The information scientist is concerned primarily with the relationship between the content of documents and the work tasks of users, including problem-solving. (p. 36)

. . . .

The objective of the information scientist must be to retrieve and supply information that is geared to problem-solving, work tasks and the predetermined goals and objectives of the institutions in which users work.

. . . .

Let us now explore how an emphasis upon problem-solving involves skills and activities that are not usually part of the equipment of librarians, and calls for new attitudes and understanding, which we argue here is part of information science. (p. 37)

. . . .

[An] information specialist must be familiar with (a) tasks of users, (b) information needed and information available to contribute to tasks, and (c) technical aspects of information storage and retrieval necessary to make information accessible. Traditionally librarianship has been concerned only with technical aspects. (p. 38)

. . . .

Of course what we are suggesting here is a radical departure from the traditional approach of librarians playing a passive role, of receiving requests for information, and providing documents and information--and leaving the matter at this level. Information specialists must ask a good many more questions. (pp. 38-39)

. . . .

The information specialist must select and filter information and/or documents in the retrieval process.

. . . .

Information specialists must make use of the feedback from users, not only user satisfaction, but the way in which information is used in decision-making, problem-solving, etc. (p. 39)

. . . .

We have been saying that information science, if it does exist as a subject in its own right, has something to do with problem-solving, knowledge structure, the accumulation of knowledge, the content of documents (rather than the documents themselves), and the relationship between documents, but is not primarily concerned with bibliographical aspects of documents.

. . . .

[Information science] has to do with the relationship betwen documents as measured by the reactions of users, or indirectly, by citation; the contents of documents; and the value of information in science, technology, research, and problem-solving. (p. 40)

. . . .

Certainly an important goal of information scientists in the next decade is to make sure that the vast existing stores of information and knowledge are put to much better use than they have been in the past. (p. 46)

Buckland, 1977:

It is not a new observation that the term [information science] has been used carelessly in library schools and it has often saddened me that very often some pioneers . . . suffered from deans and administrators who had the habit of behaving as though information science included every combination of "information," "science," and "engineering." This meant that the pioneers would be liable to teach courses on the bibliography of science, on the use of computers in libraries, the operation of science information centers, and scientific management as applied to libraries. This indiscriminate use of the term information science persists. Even now, an operations research specialist whose interest is in library problems, is likely to be called an information scientist.

The situation has been exacerbated by a very simple human problem: it is not clear what one should call somebody with an expert interest in libraries who is not a librarain. Of course, during the 1950s and the 1960s, back in the days when science was fashionable it seemed only natural to call him or her an information "scientist." This appeared to some as being more dignified and therefore superior to "librarian." The result of this combination of status-seeking and the "if it's not traditional librarianship it must be information science" has not helped the development of a coherent well-reasoned terminology or image in our field. It was someone who like to infer definitions from observation rather than first principles who came up with my favorite definition of information science: "Information science comprises those topics taught in library schools that were not in the curriculum of the Graduate Library School in Chicago in 1950." (p. 15)

. . . .

So far as more reasonable interpretations of information science are concerned, I will distinguish three.

There is the "all-embracing information science" in those heady, early days of Claude Shannon, Norbert Wiener, Vannevar Bush, and others.

. . . .

A second definition concerns computers. There persists a widespread assumption that "data processing applied to libraries" and "information science" are largely synonymous. . . . I had thought that the phlogiston theory of converting base metals into gold was a fantasy until it occurred to me that systems analysis when applied in other contexts is business administration, but systems analysis applied to libraries mysteriously becomes information science.

. . . .

There is a third area that can be called information science in that it involves the scholarly study of information; . . . This concerns access to recorded information--the transmission of knowledge through records. I include in this the whole area of indexing and all that has been hypothesized about processes of information storage and retrieval, the meaning of indexing, and the interfaces between users and indexes and records. . . .

We must include the explication of human behavior associated with all these activities. The field is clearly as much a part of the social sciences as anything else. . . .

I find it convenient to refer to this field as "library-and-information-science" (all one word). The advantage of the phrase "library-and-information-science" is that it helps us get away from the stultifying polarization of librarianship versus information science.

. . . .

Now if we adopt the "library-and-information-science" definition of our subset of "all-embracing" information science, and if we regard the information science component as primarily theoretical activity, then more needs to be said. . . . [Information science] must do more than be a theoretical activity. It must relate in some way to activity involving access to information. Library provision is an almost ideal area of activity for such study, but not the only one. (p. 16)

. . . .

What we need [is] . . . most of all, an integrating drive to redress the damage done by the tendency to separate information science from librarianship. (p. 17)

Davis, 1977:

With respect to professional vs. academic and historical vs. scientific approaches [to library school curricula], there can be no question that librarianship traditionally derives from professional and historical concerns, whereas information science is more often associated with academic questions and scientific methodologies. This situation gives rise to the "Two Cultures" split, wherein those of a literary bent are allegedly pitted against the scientific and technological Philistines. (p. 20)

. . . .

The problem of nomenclature is fairly well known. . . . It seems apparent to me that many of the difficulties are emotional rather than real. That is, there are differences in connotation rather than denotation--an example being whether one prefers being called a librarian or an information scientist--categories which are scarcely mutually exclusive, ...

. . . .

Librarianship has long been thought of as a humanistically-oriented field, ... (p. 21)

. . . .

[The] "Two Cultures" concept . . . overlooks the likely development of a Third Culture consisting largely of the social and behavioral sciences, ...

> In any case, there seems to be little question that we have entered a post-industrial or cybernetic revolution, in which the information transfer process has assumed considerably more importance than the extension of muscle power through machines. If such a third culture does mature and flourish, then it seems quite reasonable to think that a new "interdiscipline" of library and information science, showing typical hybrid vigor, will become that culture's premier field. (p. 23)

Garrison, 1977:

> Anyone can make up his own list of information specialties which are looking for a respectable academic home and belong in our [library] schools. Here are a few: 1) records management; 2) art and museum librarianship; 3) archives, manuscripts and oral history; 4) science information; 5) technical information center management; 6) information systems desing; 7) urban information (both to the people and to the professionals); 8) learning resource centers (broader than school libraries); 9) national and international information networks and policies; 10) ethnic, language, and area studies; 11) biomedical communications.
>
> . . . .
>
> I maintain that these are only the tip of an information iceberg, and that the list can be extended to embrace many more specialties within what I am calling the diversifying information profession.
>
> . . . .
>
> We need to agree first that there is an information profession larger than library science and that there can be professional schools of information larger than present library schools. (p. 181)

Kirwin, 1977:

> Indeed, the term information science is so broad as to encompass most of the traditional social sciences and liberal arts, in addition to computer science, library science, and cybernetics.
>
> Information science as a practice often tends to be library science. This is a natural consequence of interest in the problems of access to scientific and technical information.
>
> . . . .
>
> [Mass-communication and business-information systems] are given relatively little attention in the information science literature. Yet whether we call ourselves library scientists, computer scientists, or communication scientists, we are all information scientists concerned with the communication of information. Our interests differ only in details such as transmission medium, message content, types of sources and receivers, and persuasive intent. (p. 24)

Koblitz, 1977:

> Table 1 shows the present state of scientific development in the field of socially organised information.
>
> The classification of practical activities and the respective sciences given in the Table is to be seen as a first, tentative attempt at their typology according to the kind of 'information process'.

. . . .

Table 1

Development of Sciences in the Field of Socially Organised Information

Practical field (object level)	Science (metalevel)
Publishing } Booktrade }	Publishing and booktrade science*
Information and documentation	Information and documentation science
Librarianship	Library science
Record keeping	Archive science
Museums	Museum science
Translation	Translation theory
Journalism	Science of journalism
Reporting and accounting	Statistics
Education	Pedagogics
Cinema	Cinema science
Scientific and technical publicity	
Advertising, etc.	

(p. 15)

. . . .

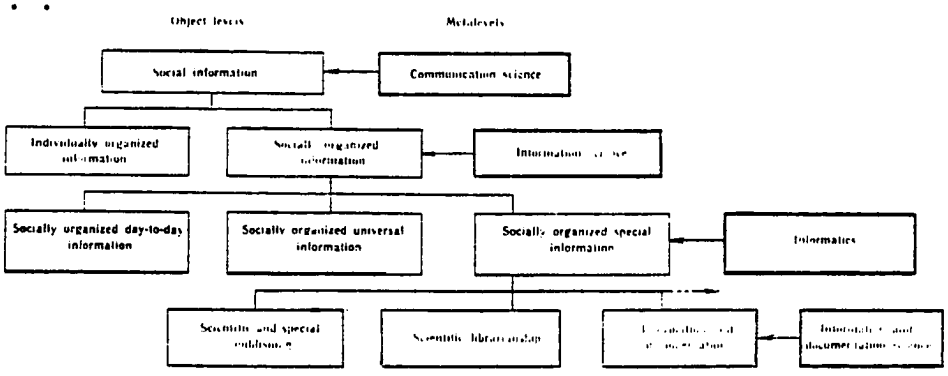
The classificatory characteristics of the sciences listed in Table 1 as being concerned with the neighbouring sectors of socially organised information are similar. Accordingly, one can regard these sciences (such as library science) as being allied to information and documentation science. The subject scopes of information and documentation science and of the allied sciences are more or less independent areas of activity which differ from one another in certain specific features and at the same time, in my view, have a common basis inasmuch as they embody information processes--all having a certain goal, content and means of expression in accordance with the form of motion that determines their essence. To be more specific, this common basis of all information activities consists in the fact that in all of them there appear such elements as information need, information user, information flow, information system, information source, information media, analysis of information sources, information storage, retrieval, information retrieval system, information language, information dissemination, etc. None of these elements is peculiar to any one of the sciences listed in Table 1, though each examines it to some extent, depending on its subject scope. The science concerned with these special questions and with elaboration of the scientific bases of the other disciplines that study the individual sectors of socially organised information may be called information science. (pp. 18-19)

. . . .

I believe that, by its subject scope, information science occupies an intermediate position between communication science and informatics, . . . the science of special information. . . . The fact that informatics is referred to the groups of sciences which study neither social information as a whole nor any particular field of it (see Figure) suggests that it must be an integrative discipline whose goal it is to develop the theoretical principles of the sciences that are entirely (like information and documentation science) or partially (like library science) concerned with the study of special information. Consequently, informatics is a social science which is mainly theoretical. (p. 19)

. . . .

. . . .



The place of information and documentation science in the system of disciplines studying social information processes.

(p. 18)

Sergean, 1977:

> The terms of reference of this project required the research team to consider libraries and information units of every main type, . . . (p. 2)
>
> . . . .
>
> One problem for the outsider who is required to work in this field is its lack of definition, ie the absence of precise and generally-agreed boudnaries. Which staff are covered? What kind of information is the legitimate concern of the information specialist? What activities may be included under the heading of librarianship and information work?
>
> . . . .
>
> This difficulty in defining the library and information field appears to stem directly from the nature of the commodity handled, namely information. This commodity differs from most others in that it is not, and never can be, the exclusive province of one occupational group, but is the concern of many.
>
> . . . .
>
> The terminology of this field forces one to speak of libraries and information units, librarianship and information work, librarians and information specialists etc. . . . . 'Librarianship and information work' (as practised by the 'librarians' and 'information workers'. . .) is regarded as a single service industry or activity dealing with a common commodity (namely, information) in various forms. . . . This applies whatever the purpose or setting involved. Cultural and recreational material is just as informative as advisory or instructional material, if one regards information as the basis for attitudes, decisions and behaviour. Similarly the person who hands a book across a counter is just as much involved in the information business as one who supplies a critical assessment of it. (pp. 7-8)
>
> . . . .
>
> This report is concerned with the 'information business' (whether it be called 'library work' or 'information work' or 'librarianship and information work'). . . . The research team found nothing in the course of this project to suggest the existence of two occupational areas, 'library work' and 'information work', which are quite different in nature. Such boundaries and barriers as exist appeared to be largely artificial. (p. 8)

Sullivan, 1977:

> Throughout this discussion, we have used the term, "librarian," but some of the positions described might be held by persons who are media specialists, learning resource specialists, documentalists, or information scientists. For example, a brochure issued by the American Society for Information Science offered the following list of terms to designate the many kinds of positions filled by information professionals:
>
> | | |
> |---|---|
> | Library Systems Analyst | Bibliographic Searcher |
> | Abstractor-Indexer | Information Scientist |
> | Information Center Manager | Professor of Information Studies |
> | Special Librarian | Computational Linguist |
> | Data-Base Manager | Cyberneticist |
> | Information Systems Engineer | Management Information Systems Specialist |
> | Media Specialist | Records Manager |
> | Microform Technologist | Thesaurus-Maker |
> | Technical Writer or Editor | Systems Programmer |
> | Technical Information Scientist | Applications Programmer |
> | Information Broker | |
>
> From that list, it seems clear that some information science positions are quite different from those in librarianship but that there is considerable overlap, just as there is an overlap of the kinds of competencies both careers require. The increasing significance of the computer in the information field has attracted to information specialties people who would be surprised to hear that others might consider them librarians. (pp. 33-34)

Whiteman, 1977:

> [The] distinction between library studies and information studies (or library science and information science) has always seemed to me to be one more of degree and emphasis than of basic content. The recent document on Criteria for information science, sent to library schools and to the CNAA [Council for National Academic Awards] Librarianship Board by the Institute of Information Scientists, drew the comment that half of the criteria listed would be necessary to a definition of librarianship also and that the degree of overlap was considerable. . . . [The] gap is certainly one which is being narrowed as time goes on and attitudes become less entrenched. This closing of the gap between librarianship and information science obviously has a bearing on any talk of curriculum and particularly so perhaps where postgraduate courses are concerned. (p. 28)

Wright, 1977:

> I think I can see clearly that librarains and information scientists alike have gotten their own ideas all mixed up with the world and with the ideas they are supposed to be studying in the "science" of information, and that a terrific confusion of noumenal and ontological realities will have to be carefully sorted out before any meaningful progress can be made. I have chosen my own turf--a limited knowledge of classical antiquity--as the means of stating precisely why anyone seriously interested in the critical study of information should not try science. The argument, briefly stated, is that information cannot be the proper object of a science for two reasons: 1) information is a nonphysical phenomenon made up entirely of spiritual structure and form, not of material substance and content; and 2) form, precisely qua form, cannot function as the direct object of a science, which must have a physical referent (phenomenal base) in the material universe. (p. xv)
>
> . . . .
>
> ["The informational view of history" argues] that every human society is dependent upon the information system available for its use, and that Western history has relied heavily upon (1) the natural communicative condition of man, and (2) the artifical technologies of information, ... (p. xvii)
>
> . . . .
>
> The book regards the nomadic bard traditions, including the Homeric tradition, as the oral surrogates of librarianship, an identification that may seem startling at first blush; but the informational functions of the former are surprisingly like those of the latter, for whenever human societies are created in the absence of writing "oral tradition forms the main available source for a reconstruction of the past, and even among peoples who have writing, many historical sources, including the most ancient ones, are based on oral traditions" [Jan Vansina, 1965]. (p. xxii)
>
> . . . .
>
> It would seem that librarianship, itself an insubstantial structure of formal order relationships, is nevertheless solidly in the camp of Plato, along with the librarian. . . . [The] direct object of their [librarians'] interest is the noetic forms of the human mind itself; and that is a problem inherent in the nature of man, not a cosmological problem. Why, then, do librarians persist in trying to solve the fundamental problems of librarianship by scavenging in the camp of science? (p. 9)
>
> . . . .
>
> In a very real sense, there is only one system of philosophy, the human information system. All of the philosophical systems are ways of thinking about something, ... (p. 10)
>
> . . . .
>
> [Whereas] librarianship can be studied scientifically as an existential object, or as a social phenomenon, its nature can best be studied, perhaps, as an integral part of the larger study of the nature of man which contains it. This is essentially the philosophical study of human information processes; . . . . (pp. 10-11)

. . . .

If the argument of this paper is correct throughout, it would seem to mean that the entire information science movement is misconceived, since information is noetic form, and form precisely qua form cannot be the proper object of a science. The expressive vehicle of information, on the other hand, can be studied scientifically, and that seems to be what the information scientists are actually studying. (footnote 117, p. 32)

. . . .

Librarians ought to show great interest in these oral surrogates of libraries ["oral memory", "folk memory in the form of popular mythologies, religious rituals, formular language, bard traditions, and the like"], as they can shed much light on the nature of information. (footnote 123, p. 33)

Boaz, 1978:

What is the "future of the future" for libraries and the information science profession? What conditions and trends will affect the services of libraries and the programs of library schools? . . . It is important that the library profession plan to manage the future, not be managed or overwhelmed by it.

A course of action . . . was set up to try to get opinions and reactions . . . about possible future trends which might affect libraries and library education. (p. 315)

. . . .

[Most of the respondents] believe that technology will be one of the strongest factors in the future of the library/information science profession. (p. 320)

. . . .

Courses and research projects should be undertaken which will prepare librarians and information scientists to study user needs and develop prototype home delivery systems. (p. 321)

Garfield, 1978:

Back in the 1930's when ADI [American Documentation Institute] began, "documentation" was an avant-garde term in library and archival circles. Microfilm was seen as the wave of the future. . . . By the late 1950's, however, "documentation" had out-moded connotations. Computers, far more than microfilm, were revolutionizing scientific information processing. (p. 448)

. . . .

Eventually the effort to change the name [of ADI] proved successful. But the exertion required was enervating to say the least. I was subjected to considerable abuse by members of the old guard, many of whom seemed to have a vested interest in the word "documentation." In 1968 ADI was finally changed to American Society for Information Science (ASIS). But by that time it was already apparent that this change was not enough. While there has been considerable theoretical work in information science, much more growth has taken place in the area of information technology.

. . . .

My concern with organizational names developed from some early personal experiences.

> In 1954 I set up practice as a documentation consultant. . . . Later on . . . I changed this to Eugene Garfield Associates--Information Engineers. Shortly thereafter, I received a letter from the Pennsylvania Society of Professinal Engineers informing me that it was illegal to call myself an engineer. (p. 449)

Koblitz, 1978:

> From the conceptual viewpoint, the information science has as its goal the study of the features, structural and dynamic regularities common for all sectors of socially organised information (like publishing and booktrade; librarianship; information and documentation; record keeping; museums; translations; scientific and industrial publicity; press, radio, television, cinema; statistics and accounting; advertising; education, etc.). (p. 20)
>
> . . . .
>
> [Information] and documentation embraces the entire area of special information, and not only its component parts like "scientific information" or "technical information", although it does not tackle all the information problems existing in that area. (pp. 22-23)
>
> . . . .
>
> Information and documentation is a working field of socially organised information activity whose special tasks include the generation, storage, retrieval, dissemination, and promotion of information about new knoweldge, experience, concepts, hypotheses, forecasts, etc., in all spheres of human activity. The generation of such information is mainly carried out through analysis and synthesis of information sources contents, in particular of primary documents, and is called "documentation". The results obtained are termed "documentalistic information". (p. 23)
>
> . . . .
>
> The term "information and documentation" should, therefore, be taken as synonymous to "documentalistic information", so that "information and documentation science" should be interpreted as "the science of documentalistic information". (p. 27)
>
> . . . .
>
> [One] can regard respective sciences, like library science, archive science, etc., as being closely related to information and documentation science. The subject scopes of information and documentation science and of the allied sciences are more or less independent areas of activity which differ from one another in certain specific features and at the same time have a common basis inasmuch as they embody information processes--all having a certain goal, content and means of expression in accordance with the form of motion that determines their essence. To be more specific, this common basis of all information activities consists in the fact that in all of them there appear such elements as information need, information user, information flow, information system, information source, information media, analysis of information sources, information processing, storage, retrieval, information dissemination, information promotion, etc. None of these elements is peculiar to either information and documentation science or to any allied discipline, though each examines them to some extent, depending on its subject scope. The science concerned with these special questions and therefore with

elaboration of the scientific bases of the other disciplines that study the individual sectors of socially organised information may be called information science. (p. 28)

At the beginning of the paper it was described as an interdisciplinary (integrative) science of the social type having primarily a theoretical character. I believe that, by its subject scope, information science occupies an intermediate position between communication science and informatics, . . . the science of special information. . . . This determination of the place of informatics in the framework of science as a whole or any particular field of it suggests that it must be an integrative discipline whose goal it is to develop the theoretical principles of the sciences that are entirely(like information and documentation science) or partially (like library science) concerned with the study of special information. Consequently, informatics is a social science which is mainly theoretical. (pp. 28-29)

Mikhailov and Gilyarevsky, 1978:

The interrelationship of library science and informatics is determined to a large extent by the interrelationship of librarianship and scientific-information work. We believe that these two distinct human occupations within the general system of scientific communication have different tasks and aims, which predetermines the independence of the scientific disciplines concerned with their patterns.

. . . .

For millennia the library has been the only social institute to gather and summarise the experience of information service to science. (p. 131)

. . . .

On the other hand, scientific-information work, which became established as an organised line of activity also in the middle of this century, began by tackling the problems of information retrieval which until then was the private concern of the individual scientist.

. . . .

Thus, while informatics is in some degree historical descendant of library science, the inherited experience has been completely reapprised. By now informatics has by far overstepped the range of problems with which library science is concerned, and is aiming at an overall investigation of the general patterns of all the processes of scientific (scientific only) communication. As for library science, it also greatly exceeds the bounds of scientific communication since librarianship provides for the public use of all written, printed, etc. records, i.e. all kinds of social information (aesthetical as well as logical). Besides, whereas scientific-information work has for its objective only to increase the efficieny of R & D activities, librarianship uses its special approaches and techniques to help find solutions to problems facing mankind and its individual classes.

The functional independence of the two occupations and the relevant disciplines under discussion stems therefore from the difference in the tasks that confront them and the scope of social information covered by them. (p. 132)

. . . .

We have established . . . that librarianship and information work can be regarded as successive stages in scientific communication. (p. 138)

Wersig and Seeger, 1978:

Traditionally we would consider the field of discourse as being composed of the following fields of activity:
- public libraries
- learned/academic libraries
- scientific and technological information services.

But some other fields of activity require more attention as belonging to the same professional context, such as:
- archives
- registries
- museums
- business information
- information in public administration
- public information systems.

The enlargement of the field of consideration is another aspect of making trend statements more internationally applicable; the restriction to scientific and technological information is not acceptable in several [developing countries] . . . . But if we consider information/documentation to be a larger area, then this sector of social activity is large enough to be viewed as a socially relevant one. (p. 432)

. . . .

There are several surveys and observations which show that on a specific level of general education most of the activities--at least in the traditional domain of information/documentation/librarianship--could be performed by people with no professional training but who have only been introduced to the practice of a respective institution. (p. 433)

Bobinski, 1979:

Librarianship is considered to include information science and media librarianship. (p. 1)

Buckland, 1979:

The rhetoric would suggest that the institution, the library, should dominate the definition of the field of interest of library schools.

. . . .

A simple approach would be to state that a library school's field is co-terminous with the institutions known as libraries and the preparation of staff to work in them. . . . [Libraries] are complex institutions and are fundamentally concerned with the fabric of human knowledge, with many intangible values, ... (p. 424)

. . . .

From a naive, academic intellectual view it would seem more sensible to take a more conceptual approach, to identify the skills, mysteries, or science that are characteristic of libraries, and to emphasize this underlying science. The tacking of "...and

information science" on to library schools' names suggests this more basic, broader view. (p. 425)

Yet in practice, the evidence remains thin. The students are still heading for libraries and the "information science" tends on closer inspection to be data processing applied to libraries--or something less than one might expect "information science" to be.

. . . .

Yet if we have any significant insights concerning libraries and if the underlying "science" characteristic of librarianship also occurs elsewhere, why don't our academicians also offer and test their insights in these other contexts also?

. . . .

Broadening the field of vision and broadening the range of occupations that students are prepared for would not come easily.

. . . .

It has been argued that these faculty [drawn from the ranks of practicing librarians] see themselves as "librarians who happen to be teaching" rather than "academics who are interested in library problems." The distinction and implied differences are significant.

. . . .

However, I, for one, am unable to avoid the conclusion that just as librarians' "science" is too important to be confined to professional librarians, so also there would seem to be a loss to all parties if we librarians and library school academics restrict our attention exclusively to the institution the library. (p. 426)

An, 1980:

The nature of Information Science as a discipline has been a topic of professional concern since early 1960's. . . . Its relationship with other disciplines has been painfully delineated, especially with that of librarianship. Its status as a science, a technology, or just a field of interdisciplinary study is still debated. No consensus has been reached from these discussions. (p. 3)

. . . .

[The microanalysis of vocabulary change in information science reveals that] the perennial prominence of "information" and "library" indicates the existence of a paradigm in Information Science, involving these two words.

. . . .

The formation of the nucleus by "information", "library", "libraries", and "technical" indicates that Information Science, as defined by ISA [Information Science Abstracts], is strongly library oriented. But the editorial notes in ISA have been ignoring this fact. (p. 169)

Heilprin, 1980:

This suggests two obvious functions which, adopted in time, might maintain its [the library community's] competitive independence in the information ecology: systematic continuing education during the professional life of the community, and community support of and participation in research on the fundamentals of the information

process. (p. 389)

. . . .

Within the same era [of historic human ascent] arose an organizational artifact the function of which was . . . to sheathe the tool [i.e., the record which carries a message intended for someone] that enables man to make all artifacts. Later the library acquired other functional links, notably with the educational community. (p. 390)

. . . .

[The library community] approves but does not undertake study of the fundamental processes of becoming informed, taking "information science" seriously as a science rather than as a service. (p. 391)

. . . .

Neither of the proposed new essential functions for the library community is new or hard to implement. Take the first: Perform research on the fundamental processes by which recorded information is transmitted; develop information science. The main requirement is a change in point of view of library schools and libraries as to what they are doing. They are not only dealing with archives and libraries, computer networks, and trasfer media, making collections, finding references, and helping select good literature, but are applying knowledge of how man acquires, transforms in his body, and uses information. The latter sequence is the basis of the former, and will of necessity generate a science of enormous range, underlying all knowledge. (p. 393)

. . . .

Conversely, if there is hope that a nascent science of information become independent, it must support and be supported by those applying it. (p. 394)

. . . .

TABLE 3. Essential functions proposed to be performed by the library community; new: 4.6.

Continually:	
(1)	Select, collect, and preserve recorded knowledge
(2)	Provide access to recorded knowledge
(3)	Disseminate recorded knowledge to users
(4)	Perform research on the fundamental processes by which recorded knowledge is transmitted, develop information science
Cyclically:	
(5)	Conduct education and training in the processes by which recorded knowledge is transmitted
(6)	Under lifelong contract, periodically continue post-first-degree professional and scientific education

(p. 392)

Shera, 1980:

The librarians talk glibly of library science, and indeed strive to endow it with scientific principles, but neglect the fact that librarianship has emerged from a humanistic tradition. (p. 315)

. . . .

Information science . . . seems to be concerning itself primarily with the effectiveness of the communication channels in society

and has not as yet addressed itself to the origins of the growth of knowledge and the impact of that knowledge on its coeval culture. Moreover, inforamion scientists seem to be aligning themselves with the natural sciences, which deal with physical phenomena, things, whereas the library and librarians deal with ideas and knowledge and their communication; hence librarianship is much closer to the humanities than to the "hard" sciences.

Thus there emerges a need for a new discipline of science, of communication. . . . We are concerned here with a body of knowledge about knowledge itself . . . how knowledge is coordinate, integrated, and put to work. . . .

. . . .

The new discipline that we here envisage, and which for want of a better name we have called "social epistemology," will provide a framework for the effective investigation of the whole complex problem of the intellectual processes of society--a study by which society as a whole seeks to achieve a perceptive or understanding relation to the total environment. (p. 316)

Smith, 1980:

Although there is a present tendency to regard libraries as information systems, the two functions should really be separated, even if there is an attempt to carry out both activities in the same institution. (p. 72)

. . . .

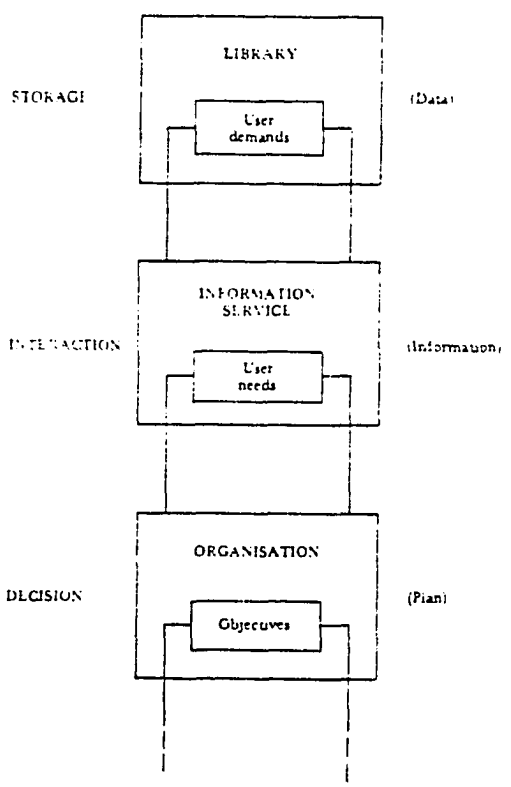


Figure 6: information systems (p. 71)

Debons, King, Mansfield, and Shirey, 1981:

> In a further attempt to narrow the definition of an "information professional" the following thesis was formulated:
>
> An information professional may be differentiated from other professionals who may also work with data by the fact that sh/he is concerned with content (the meaning applied to symbols) and therefore with the cognitive and intellectual operations performed on the data and information by a primary user. (p. 31)
>
> Six generic groups of information professionals were suggested, and the intent was to allocate each major information function, or group of functions, to one of these six categories of professionals:
>
> Managers of Information who plan, develop, coordinate, and control information programs and systems, and the human and material resources needed for their implementation.
>
> Information Operations Coordinators who perform functions with regard to (a) the data or knowledge base, and (b) the primary user, in the installation, operation, maintenance, and control of information systems, their equipment, and processes.
>
> Information Systems Specialists who analyze information problems, and who design, implement, and evaluate solutions.
>
> Information Intermediaries who work between the primary user and the data and information source, helping the user to reach an informed state.
>
> Information Theorists who are concerned with the development of laws, theories, philosophy, and sociology of information.
>
> Educators and Trainers of Information Workers who provide education and/or training for all categories of information professionals, as well as for paraprofessional and nonprofessional information workers. (pp. 31-32)
>
> . . . .
>
> Detailed desciptions of each of the function groups were supplied for the guidance of survey respondents, and were illustrated by sample occupational titles of persons performing the functions. (p. 36)

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Vita

Alvin Marvin Schrader was born in Bentley, Alberta, on March 11, 1944, the son of Herb Schrader and Ethel Jean (McCall) Schrader. He graduated from William Aberhart High School in Calgary, Alberta, in 1962. After attending the University of Alberta in Calgary (now the University of Calgary) for two years, he transferred to the University of Alberta in Edmonton to complete the Honours B.A. degree in history; he graduated *magna cum laude* in 1966. He studied Canadian history and political science at Carleton University, Ottawa in the following year and was awarded the M.A. degree in 1972. From 1967 to 1972, he was a civil servant for the Province of Ontario, in Toronto. During the next year, he was a financial analyst and planning consultant with Paterson Planning and Research of Scarborough, Ontario.

In the fall of 1973, he entered the M.L.S. program at the University of Toronto as a full-time student and served for two terms as research assistant to Dr. L. Houser, Associate Professor of Library Science. During the summer of 1974, he was employed by the Ontario Legislative Library. In 1975, he received the Ontario Library Association Prize for highest standing in the M.L.S. graduating class. From August of that year to the end of 1976, he was information resources consultant for the Council of Ministers of Education, Canada. For the following two and a half years, he was deputy branch head and coordinator of information services of the Chinguacousy Branch of the City of Brampton Public Library and Art Gallery.

He began doctoral study in the School of Library and Information Science at Indiana University, Bloomington campus in the fall of 1979. He received the graduate fellowship of the School of Library and Information Science at Indiana University for two years and was a holder of the doctoral fellowship of the Social Sciences and Humanities Research Council of Canada for three years. He served as associate instructor in the School of Library and Information Science at Indiana University for two consecutive summer sessions, teaching the M.L.S. course entitled "Introduction to Research in Library Science". He is presently in his second year as assistant professor on the Faculty of Library Science at the University of Alberta in Edmonton.

His M.L.S. research project was published in 1976 as "Library Science Education in Canada; the knowledge bank of library science as indicated by course reading lists in Canadian library schools". Other publications have been "The Role of the PhD Dissertation in Library Science" (1979), "Performance Measures for Public Libraries: Refinements in Methodology and Reporting" (1980), and "Teaching Bibliometrics" (1981). His most well-known publication is *The Search for a Scientific Profession: Library Science Education in the U.S. and Canada* (Scarecrow Press, 1978), which he co-authored with Dr. L. Houser. In 1983, he received the Research Paper Competition Award from the Association of American Library Schools for a paper entitled "In Search of a Name: Information Science and Its Antecedents". A revised version of the paper was accepted for publication by *Library and Information Science Research*, volume 6 (1984).