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Social Digital Libraries: Their Roles Within and Across Social Worlds, Information Worlds, and Communities

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ABSTRACT

There is continuing need for theoretical and practical research to consider the roles that digital libraries play in collaboration, communities, and other social contexts. My dissertation research looks to help fulfill this need, examining the roles digital libraries play, as boundary objects, within and across social worlds, information worlds, and communities. In this paper, I review related literature, present my research questions, and discuss my use of content analysis, surveys, and interviews to study the roles played by the LibraryThing and Goodreads digital libraries within and across communities. I also explain the expected benefits and contributions of my dissertation research and present brief, initial findings from the content analysis.

Categories and Subject Descriptors

H.3.7 [Information Storage and Retrieval]: Digital Libraries – *User issues*; H.5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces – *Computer-supported cooperative work, Theory and models*; K.4.3 [Computers and Society]: Organizational Impacts – *Computer-supported collaborative work*.

General Terms

Design, Human Factors, Theory.

Keywords

Social informatics, digital libraries, collaboration, communities, boundary objects, social worlds, information worlds

1. INTRODUCTION

The historical focus of information science is often seen as the problem of information retrieval [24, 64], but the field has examined the social contexts of information and related phenomenon throughout its history. A social perspective to the field carries as far back as Bush’s famous article [15]. While some have argued he focused too much on technical and engineering challenges at the expense of human factors [70, 71], Bush did not consider his *memex* to be solely a single-user system. The information it stored was also intended to be socially exchanged, constructed, and discussed by and with other scholars and scientists within and beyond the scholar’s social network [15].

Time has brought the emergence of a social paradigm of information science, one that sees information as a broad phenomenon having “social significance” [66], as socially constructed and produced by users and user communities, and with its meaning and interpretation differing between different individuals, communities, organizations, and cultures [43, 79, 82].

Research and advocacy [e.g. 19, 46, 52, 66, 67] has led to broad—but by no means exclusive—adoption of the social paradigm among information science researchers and practitioners.

Included in this is research on digital libraries, often seen as modern-day parallels of Bush’s *memex*. Many experimental and promising models, frameworks, and methods of study have contributed to knowledge of how digital libraries can support and facilitate collaboration, communities, and other key social phenomena and contexts. However, review of the literature indicates no firm conclusions have been reached; there is continuing need for theoretical and practical research to see if and how digital libraries support and facilitate collaboration, communities, and other social contexts in light of the most appropriate conceptions of these contexts in theory and practice.

My dissertation research looks to help fulfill this need, examining the roles digital libraries play, from a social perspective, as boundary objects within and across social worlds, information worlds, and communities. This paper presents the problem statement I am addressing in my doctoral dissertation, reviews literature relevant to the problem and proposed solutions to it, the research questions I am asking to fill gaps in the existing literature, the research design and methods I am using in my dissertation, and the expected benefits and contributions of my research.

2. PROBLEM STATEMENT

The purpose of my dissertation research, taking a social and sociotechnical perspective on digital libraries, is to improve understanding of the organizational, cultural, institutional, collaborative, and social contexts of digital libraries, contexts with important effects on users, communities, and information behavior. Drawing from the literature (particularly [10]), a *social digital library* can be defined as

- having one or more collections of digital content collected on behalf of a user community;
- offering services, relating to the content, by or through the digital library to the user community; and
- being one or more—or part of one or more—formal or informal organizations managing these content and services.

All of these should be considered in light of the various contexts they inhabit, most of all the social contexts. Such a view could consider a broad range of online communities or other Web sites to be social digital libraries. While the defining line is fuzzy, it should be drawn to include those organizations, communities, and Web sites that focus on facilitating information and knowledge creation and sharing (after [51, 52]), and exclude those with a different primary motivation (e.g. selling products).

As stated in the introduction, despite the expressed need—as far back as Bush [15]—for social contexts of information to be considered under a social paradigm, many early information retrieval systems focused on the technology [64, 70, 71]. Echoes of paradigmatic unrest [27] are visible in divisions on how digital libraries should be seen [10] and rejections of technology-centric solutions to information and knowledge problems [11]. Nevertheless, many have stated and repeated calls for consideration of digital libraries as information systems constructed in social, participatory context [2, 37, 42, 51, 53, 55, 59].

Viewing digital libraries as social parallels the roles of physical libraries, which are not just physical collections and technical services but physical and conceptual spaces “link[ing] people to ideas and to each other” [63]. It also parallels the DELOS Reference Model definition [16], which included (a) an organization; (b) the collection and management of digital content; and (c) functionality and services associated with the content. Digital libraries should improve their support for social, collaborative information behaviors and activities, lest social opportunities to seek, use, and share information and knowledge become diminished or lost as libraries become increasingly digital and hybrid in nature.

3. LITERATURE REVIEW

3.1 Communities

The phenomena of *communities* and *collaboration* are key elements of this problem. A user community may consist of smaller communities or groups, adopting the subcultural view pioneered in sociology by Fischer [30] and incorporating flexible use of conceptions of community used in the research literature. A major objective of digital libraries is to support, construct, and build the different “knowledge communities” that use their content and services [4]. While there is no universal definition for the concept of *community* across or within disciplines [26, 44], two conceptions are sufficiently flexible, grounded, and appropriate for studies of social digital libraries.

3.1.1 Social Worlds Perspective

Shibutani first explicitly used the term *social worlds* [69], but it was Strauss who expanded on this to propose a theoretical “perspective” on social worlds [77]. A social world includes

- “at least one primary activity ... strikingly evident”;
- “sites where activities occur”;
- “technology ... [for] carrying out the social world’s activities”; and
- in established social worlds, “organizations ... to further one aspect or another of the world’s activities” [77].

To these four key concepts, Strauss added that social worlds could and would “intersect ... under [various] conditions” and segment into smaller subworlds given sufficient analysis [77]. Clarke and Star recently reviewed the framework offered by social worlds and a selection of studies that have put it to use [23].

3.1.2 Theory of Information Worlds

While its origination differs, a related theory and concept to social worlds is that of *information worlds*, developed by Burnett and Jaeger [13, 43]. They built on Chatman’s theory of normative behavior [12, 62], but wanted to move beyond its limitation in small worlds and Chatman’s ill-defined notion of information worlds [20–22]. They combined Chatman’s work with

Habermas’s on lifeworlds and the public sphere, incorporating five additional concepts:

- *social norms*, or the “standards of ‘rightness’ and ‘wrongness’ in social appearances” [12];
- *social types*, “the [social] classification of a person” [12];
- *information behavior*, “the full spectrum of normative [information] behavior ... that are available to members of a ... world” [13];
- *information value*, relating to the value judgments of different information within and across worlds [13]; and
- *boundaries*, places where information worlds contact each other and may exchange information and communicate with each other [43].

The resulting information worlds are overlapping communities of varied sizes, settings, and shapes, with the theory allowing for “multi-leveled” analysis of these worlds and their information-based interactions [43]. The concept and theory have been used in only a few completed and in-progress studies so far [14, 38, 83, 85], but Chatman’s earlier small world research and its frequent use in information science shows the applicability of the concepts behind the theory. The theory of information worlds is well-grounded in both sociological and information science theory and research, while remaining flexible and thus compatible with social worlds and other conceptions of communities.

3.2 Collaboration

Although kinds of and contexts for *collaboration* are well-defined, it is rare for the root concept to be specified in great detail and “no widely accepted definition of collaboration” exists [41]. Relevant literature comes from information seeking and retrieval, computer-supported cooperative work (CSCW), and scientific collaboration research [40, 41, 60, 68, 73, 78]. Gunawardena et al.’s synthesized definition of collaboration serves as a good summary: collaboration is “human behavior that makes a substantial contribution toward the advancement of a research project ... with respect to a mutually shared superordinate research goal and which takes place in a research setting” [40]. Collaboration may also take place outside of true “research” settings, in everyday life contexts; this is an artifact of the research project context of much of the literature. There is also disagreement on whether common access to information sources is required for collaboration to exist, with Sonnenwald’s definition of scientific collaboration [73] dropping that requirement.

Collaboration can differ by level or degree. One example of this is serendipitous information sharing, which is seen as “less” than collaboration by many researchers. However, serendipity is common as individual information behavior [28, 33] and integral to creativity and research across many fields. It may be that serendipity is only a form of coordination [40], but given the uncertainty in the literature, for my dissertation research I consider it as a form of collaboration.

3.3 Previous Social Digital Library Research

Many approaches, perspectives, models, and theories have been applied to studying and supporting the communities served by digital libraries and the collaborations their members engage in, with varying and mixed degrees of success.

3.3.1 Experimental

Many experimental models and perspectives proposed by researchers showed great promise at first, but have not been as successful in practice over time. Relative lack of success has been due to overly ambitious planning, lack of appropriate theoretical grounding, technological tunnel vision, limited funding, or a combination of these. These include the proposed CKESS model and project [7]; the CYCLADES project [17, 65]; the Alexander project [47–49]; Marchionini’s work with his “sharium” model [56–58, 72]; and Fox’s 5S model [1, 34, 39]. These projects and models can still help better inform the conceptualization, design, and development of social digital libraries with support for collaboration and communities.

3.3.2 Promising

Other approaches have been more successful, show substantial promise, or both, including in contexts outside the usual scope of digital libraries.

Wikis seem a natural fit for supporting collaboration around digital libraries, given their nature as social and collaborative constructions [35]. There is little known literature directly applying wikis to the design and development of digital libraries. Krowne [50] is an exception, developing a successful digital library called PlanetMath (planetmath.org) using a wiki-like approach he called “commons-based peer production.” Further work is necessary to see if wikis are appropriate for encouraging social digital libraries.

Social annotations—“enrichment[s] of information object[s] with comments and other forms of meta-information” shared with the public [61]—have been used with success to support collaboration and encourage community in and around digital libraries. The DEBORA and COLLATE prototypes found a degree of success, and the Digital Library for Earth Science Education (DLESE; dlese.org) and the Multimedia Educational Resource for Learning and Online Teaching (MERLOT; merlot.org) are more successful examples of production digital libraries using social annotations, albeit DLESE faced usability issues [3]. Social annotations have also found success in digital library-like settings and contexts, including Web 2.0 social question-and-answer site AnswerBag [37], prototype folksonomic contact manager Fringe [29], and the Steve digital museum social tagging project [5, 80]. These provide good examples of the potential of social annotations for supporting emergent community and socially constructive collaboration around and within social digital libraries.

Other more theoretical and methodological approaches also appear promising, including social constructionism [81], social network analysis [36], and the situated context of assemblages [8, 9]. Limited research has applied these to the study or design of digital libraries; the latter two are beyond scope here, but my research incorporates elements of social constructionism to study the roles digital libraries play in sociotechnical contexts.

3.4 Social Digital Libraries as Boundary Objects

3.4.1 Boundary Object Theory

Star’s boundary object theory [74, 76] is one further, very promising approach to the study and design of social digital libraries in relation to the key concepts of communities and collaboration. The theory conceives of *boundary objects* as crossing the boundaries between multiple communities, conceptualized as social worlds. Boundary objects are used within and adapted to many of these worlds “simultaneously”; they have

weak structure when used across communities, but are seen as having strong structure when created and used in individual communities. The “different” and overlapping meanings they have across communities can cause “mismatches,” which require negotiation and translation. Successful negotiation requires careful management of the boundary objects, their representations, and the interfaces they provide between social worlds. Maintaining “coherence” across and between social worlds is a critical role of boundary objects [76]. Boundary object theory has found use in a range of research, including in the cognate areas of CSCW [54] and knowledge management [6, 18, 45] and in two previous studies of social digital libraries [42, 75]. Fleischmann has also proposed its use for studying digital libraries in the context of their embedded human values [32].

3.4.2 A Synthesized Framework

Synthesizing Star’s theory with the social worlds perspective, the theory of information worlds, and other research on communities and collaboration, we can conclude that social digital libraries are used by and cross the boundaries of multiple social worlds, information worlds, and communities. They are socially constructed boundary objects [42], and should adapt to the “local needs” [74] of as many of these worlds and communities as possible. Serving as an interface and translation device between social and information worlds, they should reconcile the “meanings” and understandings across these worlds to allow users to “work together,” collaborate, and interact [76]. The translations they provide should also be coherent and consistent for and with as many of the social and information worlds that use them as possible.

Social digital libraries should support the emergence of localized and common social norms, social types, information values, and information behaviors shared—to varying and overlapping extents—by the different information worlds using them [13, 43]. Social digital libraries should also act as common sites and technologies for users to engage in information-based activities [77], including collaborative information and knowledge creation and sharing. In doing so, they should support the possible convergence and emergence of broader communities—in the form of social and information worlds—as the social digital library converges, coalesces, and reconciles portions of the multiple communities it serves.

Such a synthesis of the social worlds perspective, the theory of information worlds, and boundary object theory provides an appropriate framework for further study of the social aspects and contexts of digital libraries, a framework well-grounded in previous literature and theory and with sufficient flexibility to allow for useful analysis.

4. METHOD

My dissertation research study looks to help fill the need for theoretical and practical research to see if and how digital libraries support collaboration, communities, and other social contexts. It focuses on two cases, LibraryThing (librarything.com) and Goodreads (goodreads.com), which are digital libraries and Web sites for readers and lovers of books. They feature digital content—from outside organizations and users—collected for their users and user communities, services relating to the content and for their user communities, and formal and informal organizations managing the content and services. Their core missions are also focused around allowing users to collaboratively create and share information and knowledge about books and other related media. As such, they are social digital libraries.

While other, similar digital libraries and Web sites could be chosen for study, as large, public, multi-faceted, and social digital libraries LibraryThing and Goodreads are well-suited as cases for examining the role of digital libraries within and across communities. LibraryThing and Goodreads users serve both as a general population of Internet and digital library users and as one specialized in particular book genres, series, authors, and with a love for reading. Findings from these two cases should be at least moderately transferable to other digital library settings, particularly those with large populations and that focus on everyday-life interests, activities, and behaviors.

4.1 Research Questions

The following two research questions satisfy the purpose of this study within this setting:

- RQ1. What roles do LibraryThing and Goodreads play, as boundary objects, in translation and coherence between the existing social and information worlds they are used within?
- RQ2. What roles do LibraryThing and Goodreads play, as boundary objects, in coherence and convergence of new social and information worlds around their use?

4.2 Research Design

The study employs a case study approach [84] and a mixed methods research design, using qualitative and quantitative methods together to combine their strengths, minimize their weaknesses, improve validity and reliability, and obtain a fuller understanding of uses of LibraryThing and Goodreads as boundary objects within and across communities, social worlds, and information worlds. The design is a variation on Creswell and Plano Clark’s multiphase design incorporating elements of their explanatory sequential and exploratory sequential designs [25]. Qualitative and quantitative data will be collected and integrated in sequence; qualitative data is prioritized, but not at the expense of quantitative data collection; multiple methods are used within the one study; and the study is based on the theoretical framework discussed in the literature review and the tenets of the social paradigm, social informatics, and social constructionism. Three methods for data collection and analysis are being used, discussed briefly below. Data from each method will be analyzed both separately and together to answer the research questions.

4.3 Content Analysis of Messages

First, a content analysis phase collected and analyzed messages from LibraryThing and Goodreads’ group discussion boards. Systematic random sampling was employed to collect between 500-600 messages across 10 of these groups, taken from the groups most active and popular as of late April, 2013. Messages were collected by accessing the digital libraries’ group discussion boards and saving individual threads; at least three threads were saved per group. These were then coded and analyzed using key concepts and phenomena from the theoretical framework (see Figure 1). This phase was piloted with two groups, with appropriate changes made to the coding scheme and analysis procedures as a result to improve validity.

Initial findings from the content analysis identified more use of existing technology as a boundary object in most LibraryThing groups, while using the digital library as an emergent site and technology was more common in many of the Goodreads groups. Many of the Goodreads groups also featured more emergent social norms, often enforced by moderators and active group members. Most of the LibraryThing groups featured more

• Existing Worlds (RQ1)	
○ Translation	BO
○ Coherence	BO
▪ Social Norms	IW
▪ Social Types	IW
▪ Information Value	IW
▪ Information Behavior & Activities	IW, SW
▪ Organizations	SW
○ Boundary Object	BO
▪ Common Site	SW
▪ Common Technology	SW
• Emergent Worlds (RQ2)	
○ Convergence	BO
▪ (As above under <i>Coherence</i>)	IW, SW
○ Boundary Object as Standard	BO
▪ Emergent Site	SW
▪ Emergent Technology	SW
▪ Emergent Boundary Object	BO

Figure 1. The coding scheme drawn from the theoretical framework and used to analyze message and interview data. Concepts are labeled to indicate where they are drawn from: boundary object theory (BO), the theory of information worlds (IW), or the social worlds perspective (SW).

emergent social types, with greater social ties present. At least two different types of communities appear to exist and be supported: those bounded by common norms and technology, and those bounded by social networks and social ties. However, further data collection from the remaining phases and further analysis of data is necessary to solidify and confirm this tentative conclusion.

4.4 Survey of Users

Second, a survey phase is using an online questionnaire to obtain data from users of LibraryThing and Goodreads. Invitations to participate were sent to LibraryThing users who posted messages analyzed in the previous phase; invitations were also posted in the ten LibraryThing and Goodreads groups selected. The survey includes Likert scaled questions on the concepts used in the theoretical framework and demographic and usage questions. Two reminders will be sent during the ongoing survey collection process, which will last six weeks and should obtain at least 300 responses. Participants will be entered into a drawing for 10 \$25 Amazon.com, Barnes and Noble, or Books-A-Million gift cards as compensation. Appropriate descriptive and inferential statistical methods will be used to confirm the reliability and validity of the scales and analyze the results.

4.5 Interviews with Users

Third, a phase of semi-structured qualitative interviews will identify users for whom follow-up interviews could lead to insightful data. At least 15 users across the two digital libraries should be interviewed. Users selected will be those who can provide insightful data on the roles of LibraryThing and Goodreads in existing and emergent social and information worlds, with an eye towards obtaining thick, qualitative description of the phenomena of interest while considering time and availability constraints. The final number of interviewees may vary depending on when saturation is reached. The semi-structured interviews will follow pre-planned questions and themes drawn from the theoretical framework, but additional follow-up questions, probes, and prompts may emerge from the conversation. Critical incidents [31] of times when users

interacted with others using the LibraryThing or Goodreads digital libraries should provide a rich environment and context within which to explore these themes. Interviews will take place using online audiovisual media or telephone and will be audio recorded using computer software. Interviews will later be transcribed, then—as with messages—coded and analyzed using key concepts and phenomena from the theoretical framework (see Figure 1).

5. BENEFITS AND CONTRIBUTIONS

Since a traditional role of physical library environments is to serve as inherently social spaces [63], digital library research, design, and practice will benefit from this study's treatment of digital libraries as social spaces, examining their support for social, collaborative information behaviors and activities. Studies of social digital libraries grounded in theory, practice, and data, like this one, will help ensure social opportunities to seek, use, and share information and knowledge are not diminished or lost as libraries become increasingly digital and hybrid in nature. My dissertation should provide a fuller understanding of uses of social digital libraries as boundary objects within and across social worlds, information worlds, and communities, with expected implications for and contributions in the following areas:

- Digital library design, usability, and development, including implications for the further development of LibraryThing and Goodreads. The findings may uncover certain elements and features of the two digital libraries providing substantial support for—or substantial disruption of—users' collaborative and social information behaviors and activities within and across communities. From these, recommendations can be made for further development of these sites and of other digital libraries, for further research into these elements and features, and for the place of social features and social digital libraries in relation to more technical and retrieval-focused digital library systems.
- Provision of services in and by digital libraries. The staff of digital libraries can provide better services to users when they have a deeper understanding of the communities, social worlds, and information worlds of their users; of users' information behavior; and of the similarities and differences between and across individuals, groups, communities, and worlds.
- Use of digital libraries by their users and user communities. The results of the study will indicate how users can better collaborate and network with each other, bringing together their social and information worlds and forming new emergent worlds, and if and how digital libraries can support and encourage this.

The study will further benefit research on social networking, social media, and social Web services, given the setting of LibraryThing and Goodreads, which can be conceived as digital libraries, online communities, Web services, social networking sites, and forms of social media.

Participants in the research will receive indirect benefits through the increased knowledge and understanding researchers will have of the roles of social digital libraries within and across communities. They may benefit from the implications of the study findings as they relate to the design and development of digital libraries they may use (such as LibraryThing and Goodreads) and the provision of services to them in and by these digital libraries. Participants in the interviews could benefit from reflecting on a critical incident, and thoughtful survey participants may experience similar reflective benefits as they go through the

questions. Users of social media, social networking, and social Web services and sites will benefit from the broader implications of the results and conclusions of this study.

6. ACKNOWLEDGMENTS

I gratefully acknowledge the input and guidance of my chair Dr. Michelle Kazmer and committee members Drs. Gary Burnett, Sanghee Oh, and Deborah Armstrong during my doctoral program and the formulation of my dissertation research. I am also thankful to the faculty and doctoral students at The Florida State University School of Library and Information Studies for their help, advice, and support throughout my time there so far. Thanks also to LibraryThing and Goodreads for their cooperation and assistance and to those users of both sites who are participating in this research. Finally, I acknowledge and am thankful for the assistance of a Beta Phi Mu Eugene Garfield Doctoral Dissertation Fellowship towards this research.

7. REFERENCES

- [1] 5S framework for digital libraries: 2009. <http://www.dlib.vt.edu/projects/5S-Model/>
- [2] Ackerman, M.S. 1994. Providing social interaction in the digital library. *Digital Libraries '94: Proceedings of the first annual conference on the theory and practice of digital libraries* (College Station, TX, 1994), 198–200. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.48.2437&rep=rep1&type=pdf>
- [3] Arko, R.A. et al. 2006. Using annotations to add value to a digital library for education. *D-Lib Magazine* 12, 5 (May 2006). DOI= <http://dx.doi.org/10.1045/may2006-arko>
- [4] Bearman, D.A. 2007. Digital libraries. *Annual Review of Information Science and Technology* 41 (2007), 223–272. DOI= <http://dx.doi.org/10.1002/aris.2007.1440410112>
- [5] Bearman, D.A. and Trant, J. 2005. Social terminology enhancement through vernacular engagement: Exploring collaborative annotation to encourage interaction with museum collections. *D-Lib Magazine* 11, 9 (Sep. 2005). DOI= <http://dx.doi.org/10.1045/september2005-bearman>
- [6] Bechky, B.A. 2003. Sharing meaning across occupational communities: The transformation of understanding on a production floor. *Organization Science* 14, 3 (May 2003), 312–330.
- [7] Bieber, M. et al. 2002. Toward virtual community knowledge evolution. *Journal of Management Information Systems* 18, 4 (Spring 2002), 11–35.
- [8] Bishop, A.P. et al. 2000. Digital libraries: Situating use in changing information infrastructure. *Journal of the American Society for Information Science* 51, 4 (Mar. 1, 2000), 394–413. DOI= [http://dx.doi.org/10.1002/\(SICI\)1097-4571\(2000\)51:4<394::AID-AS18>3.0.CO;2-Q](http://dx.doi.org/10.1002/(SICI)1097-4571(2000)51:4<394::AID-AS18>3.0.CO;2-Q)
- [9] Bishop, A.P. 1999. Making digital libraries go: Comparing use across genres. *Digital Libraries '99: Proceedings of the fourth ACM conference on digital libraries* (Berkeley, CA, 1999), 94–103. DOI= <http://dx.doi.org/10.1145/313238.313267>
- [10] Borgman, C.L. 1999. What are digital libraries? Competing visions. *Information Processing and Management* 35, 3 (May 1999), 227–243. DOI= [http://dx.doi.org/10.1016/S0306-4573\(98\)00059-4](http://dx.doi.org/10.1016/S0306-4573(98)00059-4)

- [11] Brown, J.S. and Duguid, P. 2002. *The social life of information*. Harvard Business School Press, Boston, MA.
- [12] Burnett, G. et al. 2001. Small worlds: Normative behavior in virtual communities and feminist bookselling. *Journal of the American Society for Information Science and Technology* 52, 7 (May 2001), 536–547. DOI= <http://dx.doi.org/10.1002/asi.1102>
- [13] Burnett, G. and Jaeger, P.T. 2008. Small worlds, lifeworlds, and information: The ramifications of the information behaviour of social groups in public policy and the public sphere. *Information Research* 13, 2 (Jun. 2008). <http://informationr.net/ir/13-2/paper346.html>
- [14] Burnett, K. et al. 2009. Latinas cross the IT border: Understanding gender as a boundary object between information worlds. *First Monday* 14, 9 (Sep. 2009). <http://ojphi.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/viewArticle/2581/2286>
- [15] Bush, V. 1945. As we may think. *The Atlantic Monthly* 176, 1 (Jul. 1945), 101–108.
- [16] Candela, L. et al. 2007. Setting the foundations of digital libraries: The DELOS manifesto. *D-Lib Magazine* 13, 3/4 (Apr. 2007). <http://www.dlib.org/dlib/march07/castelli/03castelli.html>
- [17] Candela, L. and Straccia, U. 2003. The personalized, collaborative digital library environment CYCLADES and its collections management. *Distributed Multimedia Information Retrieval: SIGIR 2003 Workshop on Distributed Information Retrieval* (Toronto, Canada, 2003), 156–172. DOI= http://dx.doi.org/10.1007/978-3-540-24610-7_12
- [18] Carlile, P.R. 2004. Transferring, translating, and transforming: An integrative framework for managing knowledge across boundaries. *Organization Science* 15, 5 (Sep. / Oct. 2004), 555–568.
- [19] Chatman, E.A. 2000. Framing social life in theory and research. *The New Review of Information Behavior Research* 1, 1 (Jan. 2000), 3–17.
- [20] Chatman, E.A. 1983. *The diffusion of information among the working poor*. Doctoral Thesis. UMI Order No. #8328818. University of California, Berkeley.
- [21] Chatman, E.A. 1987. The information world of low-skilled workers. *Library and Information Science Research* 9, 4 (Autumn 1987), 265–283.
- [22] Chatman, E.A. 1992. *The information world of retired women*. Greenwood Press, New York, NY.
- [23] Clarke, A.E. and Star, S.L. 2008. The social worlds framework: A theory/methods package. In *Handbook of science and technology studies*, E. Hackett, ed. MIT Press, Cambridge, MA, 113–137.
- [24] Cleverdon, C. 1970. Evaluation tests of information retrieval systems. *Journal of Documentation*. 26, 1 (1970), 55–67. DOI= <http://dx.doi.org/10.1108/eb026487>
- [25] Creswell, J.W. and Plano Clark, V.L. 2011. *Designing and conducting mixed methods research*. Sage, Thousand Oaks, CA.
- [26] Ellis, D. et al. 2004. Community and virtual community. *Annual Review of Information Science and Technology* 38, (2004), 145–186. DOI= <http://dx.doi.org/10.1002/aris.1440380104>
- [27] Ellis, D. 1992. The physical and cognitive paradigms in information retrieval research. *Journal of Documentation* 48, 1 (1992), 45–64. DOI= <http://dx.doi.org/10.1108/eb026889>
- [28] Erdelez, S. 2005. Information encountering. In *Theories of information behavior*, K.E. Fisher et al., eds. Information Today, Medford, NJ, 179–184.
- [29] Farrell, S. et al. 2009. Building communities with people-tags. *Human-Computer Interaction - INTERACT 2007* (Rio de Janeiro, Brazil, Sep. 2007), 357–360. DOI= <http://dx.doi.org/10.1007/978-3-540-74800-7>
- [30] Fischer, C.S. 1975. Toward a subcultural theory of urbanism. *American Journal of Sociology* 80, 6 (1975), 1319–1341.
- [31] Flanagan, J.C. 1954. The critical incident technique. *Psychological Bulletin* 51, 4 (1954), 327–358.
- [32] Fleischmann, K.R. 2007. Digital libraries with embedded values: Combining insights from LIS and science and technology studies. *Library Quarterly* 77, 4 (Oct. 2007), 409–427. DOI= <http://dx.doi.org/10.1086/520997>
- [33] Foster, A. and Ford, N. 2003. Serendipity and information seeking: An empirical study. *Journal of Documentation*. 59, 3 (2003), 321–340. DOI= <http://dx.doi.org/10.1108/00220410310472518>
- [34] Fox, E.A. 1999. The 5S framework for digital libraries and two case studies: NDLTD and CSTC. In *Information technology and global library development: Proceedings of NIT '99* (Taipei, Taiwan, Aug. 1999), C. Chen, ed. Microuse Information, West Newton, MA.
- [35] Frumkin, J. 2005. The Wiki and the digital library. *OCLC Systems & Services* 21, 1 (2005), 18–22. DOI= <http://dx.doi.org/10.1108/10650750510578109>
- [36] Garton, L. et al. 1997. Studying online social networks. *Journal of Computer-Mediated Communication* 3, 1 (Jun. 1997). DOI= <http://dx.doi.org/10.1111/j.1083-6101.1997.tb00062.x>
- [37] Gazan, R. 2008. Social annotations in digital library collections. *D-Lib Magazine* 14, 11/12 (Nov. 2008). DOI= <http://dx.doi.org/10.1045/november2008-gazan>
- [38] Gibson, A.N. 2011. Community, place and information behavior: A case study of parents of children with Down Syndrome and government sponsored information and services. *Proceedings of the 2011 Canadian Association for Information Science conference: Exploring interactions of people, places and information* (Fredericton, NB, Canada, Jun. 2011). P.J. McKenzie et al., eds. Canadian Association for Information Science, Toronto, ON, Canada.
- [39] Gonçalves, M.A. et al. 2004. Streams, structures, spaces, scenarios, societies (5S): A formal model for digital libraries. *ACM Transactions on Information Systems* 22, 2 (Apr. 2004), 270–312. DOI= <http://dx.doi.org/10.1145/984321.984325>
- [40] Gunawardena, S. et al. 2010. Finding that special someone: Interdisciplinary collaboration in an academic context. *Journal of Education for Library and Information Science* 51, 4 (Oct. 2010), 210–221.
- [41] Hansen, P. and Järvelin, K. 2005. Collaborative information retrieval in an information-intensive domain. *Information Processing and Management* 41, 5 (Sep. 2005), 1101–1119. DOI= <http://dx.doi.org/10.1016/j.ipm.2004.04.016>

- [42] Van House, N.A. 2003. Digital libraries and collaborative knowledge construction. In *Digital library use: Social practice in design and evaluation*, A.P. Bishop et al., eds. MIT Press, Cambridge, MA, 271–295.
- [43] Jaeger, P.T. and Burnett, G. 2010. *Information worlds: Behavior, technology, and social context in the age of the Internet*. Routledge, New York, NY.
- [44] Jones, S.G. 1995. Understanding community in the information age. In *CyberSociety: Computer-mediated communication and community*, S.G. Jones, ed. Sage, Thousand Oaks, CA, 10–35.
- [45] Kimble, C. et al. 2010. Innovation and knowledge sharing across professional boundaries: Political interplay between boundary objects and brokers. *International Journal of Information Management* 30, 5 (Oct. 2010), 437–444. DOI= <http://dx.doi.org/10.1016/j.ijinfomgt.2010.02.002>
- [46] Kling, R. 1999. What is social informatics and why does it matter? *D-Lib Magazine* 5, 1 (Jan. 1999). DOI= <http://dx.doi.org/10.1045/january99-kling>
- [47] Kolbitsch, J. et al. 2007. Dynamic adaptation of content and structure in electronic encyclopaedias. *Journal of Digital Information* 8, 3 (2007). <http://journals.tdl.org/jodi/article/viewArticle/237/191>
- [48] Kolbitsch, J. and Maurer, H. 2006. Community building around encyclopaedic knowledge. *Journal of Computing and Information Technology* 14, 3 (Sep. 2006), 175–190. DOI= <http://dx.doi.org/10.2498/cit.2006.03.01>
- [49] Kolbitsch, J. and Maurer, H. 2006. The transformation of the Web: How emerging communities shape the information we consume. *Journal of Universal Computer Science* 12, 2 (2006). DOI= <http://dx.doi.org/10.3217/jucs-012-02-0187>
- [50] Krowne, A. 2003. Building a digital library the commons-based peer production way. *D-Lib Magazine* 9, 10 (Oct. 2003). DOI= <http://dx.doi.org/10.1045/october2003-krowne>
- [51] Lankes, R.D. 2009. Participatory librarianship and digital libraries (Video). In *R. David Lankes Presents New Librarianship: blip.tv*. <http://blip.tv/r-david-lankes-presents-new-librarianship/participatory-librarianship-and-digital-libraries-1692129>
- [52] Lankes, R.D. 2011. *The atlas of new librarianship*. MIT Press, Cambridge, MA.
- [53] Levy, D.M. and Marshall, C.C. 1995. Going digital: A look at assumptions underlying digital libraries. *Communications of the ACM* 38, 4 (Apr. 1995), 77–84. DOI= <http://dx.doi.org/10.1145/205323.205346>
- [54] Lutters, W.G. and Ackerman, M.S. 2007. Beyond boundary objects: Collaborative reuse in aircraft technical support. *Computer Supported Cooperative Work* 16, 3 (Jun. 2007), 341–372. DOI= <http://dx.doi.org/10.1007/s10606-006-9036-x>
- [55] Lynch, C. 2005. Where do we go from here? The next decade for digital libraries. *D-Lib Magazine* 11, 7/8 (Jul. 2005). DOI= <http://dx.doi.org/10.1045/july2005-lynch>
- [56] Marchionini, G. 1999. Augmenting library services: Towards the sharium. *Proceedings of International Symposium on Digital Libraries 1999* (Tuskuba, Japan, Sep. 1999), 40–47. <http://ils.unc.edu/~march/sharium/ISDL.pdf>
- [57] Marchionini, G. et al. 2006. The Open Video Digital Library: A Möbius strip of research and practice. *Journal of the American Society for Information Science and Technology* 57, 12 (Oct. 2006), 1629–1643. DOI= <http://dx.doi.org/10.1002/asi.20336>
- [58] Marchionini, G. et al. 2003. The people in digital libraries: Multifaceted approaches to assessing needs and impact. In *Digital library use: Social practice in design and evaluation*, A.P. Bishop et al., eds. MIT Press, Cambridge, MA, 119–160.
- [59] Marshall, C.C. and Bly, S. 2004. Sharing encountered information: Digital libraries get a social life. *Proceedings of the 4th ACM/IEEE Joint Conference on Digital Libraries* (Tucson, AZ, Jun. 2004), 218–227. DOI= <http://dx.doi.org/10.1145/996350.996401>
- [60] Mills, K.L. 2010. Computer-supported cooperative work (CSCW). In *Encyclopedia of Library and Information Sciences*, M.J. Bates and M.N. Maack, eds. CRC Press, Boca Raton, FL, 1234–1249.
- [61] Neuhold, E. et al. 2003. Personalization in digital libraries: An extended view. In *Digital Libraries: Technology and Management of Indigenous Knowledge for Global Access: 6th International Conference on Asian Digital Libraries, ICADL 2003* (Kuala Lumpur, Malaysia, Dec. 2003). Springer-Verlag, Berlin, Germany, 1–16. DOI= <http://dx.doi.org/10.1007/b94517>
- [62] Pendleton, V.E. and Chatman, E.A. 1998. Small world lives: Implications for the public library. *Library Trends* 46, 4 (Spring 1998), 732–51.
- [63] Pomerantz, J. and Marchionini, G. 2007. The digital library as place. *Journal of Documentation*. 63, 4 (2007), 505–533. DOI= <http://dx.doi.org/10.1108/00220410710758995>
- [64] Raber, D. 2003. *The problem of information: An introduction to information science*. Scarecrow Press, Lanham, MD.
- [65] Renda, M.E. and Straccia, U. 2005. A personalized collaborative digital library environment: A model and an application. *Information Processing and Management* 41, 1 (Jan. 2005), 5–21. DOI= <http://dx.doi.org/10.1016/j.ipm.2004.04.007>
- [66] Roberts, N. 1976. Social considerations towards a definition of information science. *Journal of Documentation*. 32, 4 (1976), 249–257. DOI= <http://dx.doi.org/10.1108/eb026627>
- [67] Sawyer, S. and Eschenfelder, K.R. 2002. Social informatics: Perspectives, examples, and trends. *Annual Review of Information Science and Technology* 36 (2002), 427–465. DOI= <http://dx.doi.org/10.1002/aris.1440360111>
- [68] Shah, C. 2010. Collaborative information seeking: A literature review. In *Advances in Librarianship* 32 (Nov. 2010), A. Woodsworth, ed. Emerald, Bingley, UK, 3–33. DOI= [http://dx.doi.org/10.1108/S0065-2830\(2010\)0000032004](http://dx.doi.org/10.1108/S0065-2830(2010)0000032004)
- [69] Shibutani, T. 1955. Reference groups as perspectives. *American Journal of Sociology* 60, 6 (May. 1955), 562–569.
- [70] Smith, L.C. 1981. “Memex” as an image of potentiality in information retrieval research and development. In *Information retrieval research: Proceedings of SIGIR '80, the 3rd annual ACM conference on research and development in information retrieval* (Cambridge, UK, Jun. 1980). Butterworths, London, UK, 345–369.

- [71] Smith, L.C. 1991. Memex as an image of potentiality revisited. *From memex to hypertext: Vannevar Bush and the mind's machine*, J.N. Nyce and P. Kahn, eds. Academic Press, Boston, MA, 261–286.
- [72] Sonnenwald, D.H. et al. 1999. Collaboration services in a participatory digital library: An emerging design. *Proceedings of the Third International Conference on the Conceptions of Library and Information Science: Digital libraries: Interdisciplinary concepts, challenges, and opportunities* (Lokve, Croatia, May 1999), 141–152. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.26.5897&rep=rep1&type=pdf>
- [73] Sonnenwald, D.H. 2007. Scientific collaboration. *Annual Review of Information Science and Technology* 41 (2007), 643–681. DOI= <http://dx.doi.org/10.1002/aris.2007.1440410121>
- [74] Star, S.L. 1989. The structure of ill-structured solutions: Boundary objects and heterogeneous distributed problem solving. In *Distributed artificial intelligence*, L. Gasser and M.N. Huhns, eds. Morgan Kaufmann, San Mateo, CA, 37–54.
- [75] Star, S.L. et al. 2003. Transparency beyond the individual level of scale: Convergence between information artifacts and communities of practice. In *Digital library use: Social practice in design and evaluation*, A.P. Bishop et al., eds. MIT Press, Cambridge, MA, 241–269.
- [76] Star, S.L. and Griesemer, J.R. 1989. Institutional ecology, 'translations' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39. *Social Studies of Science* 19, 3 (Aug. 1989), 387–420. DOI= <http://dx.doi.org/10.1177/030631289019003001>
- [77] Strauss, A. 1978. A social world perspective. In *Studies in symbolic interaction: An annual compilation of research*, N.K. Denzin, ed. JAI Press, Greenwich, CT, 119–128.
- [78] Talja, S. 2002. Information sharing in academic communities: Types and levels of collaboration in information seeking and use. *The New Review of Information Behavior Research* 3 (2002), 143–159. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.96.163&rep=rep1&type=pdf>
- [79] Talja, S. et al. 2005. "Isms" in information science: Constructivism, collectivism and constructionism. *Journal of Documentation* 61, 1 (2005), 79–101. DOI= <http://dx.doi.org/10.1108/00220410510578023>
- [80] Trant, J. 2009. Tagging, folksonomy and art museums: Early experiments and ongoing research. *Journal of Digital Information* 10, 1 (2009). <https://journals.tdl.org/jodi/article/view/270/277>
- [81] Tuominen, K. et al. 2003. Multiperspective digital libraries: The implications of constructionism for the development of digital libraries. *Journal of the American Society for Information Science and Technology* 54, 6 (Apr. 2003), 561–569. DOI= <http://dx.doi.org/10.1002/asi.10243>
- [82] Tuominen, K. and Savolainen, R. 1997. A social constructionist approach to the study of information use as discursive action. In *Information seeking in context: Proceedings of an international conference on research in information needs, seeking and use in different contexts* (Tampere, Finland, 1996). Taylor Graham, Los Angeles, CA, 81–96. http://informationr.net/insic/ISIC1996/96_Tuominen.pdf
- [83] Worrall, A. et al. 2012. Observations of the lifecycles and information worlds of collaborative scientific teams at a national science lab. *iConference 2012* (Toronto, ON, Canada, Feb. 2012), 423–425.
- [84] Yin, R.K. 2003. Designing case studies. In *Case study research: Design and methods*, 3rd ed. Sage, Thousand Oaks, CA, 19–56.
- [85] Yu, L. 2012. Towards a reconceptualization of the "information worlds of individuals." *Journal of Librarianship and Information Science* 44, 1 (Mar. 2012), 3–18. DOI= <http://dx.doi.org/10.1177/0961000611424586>