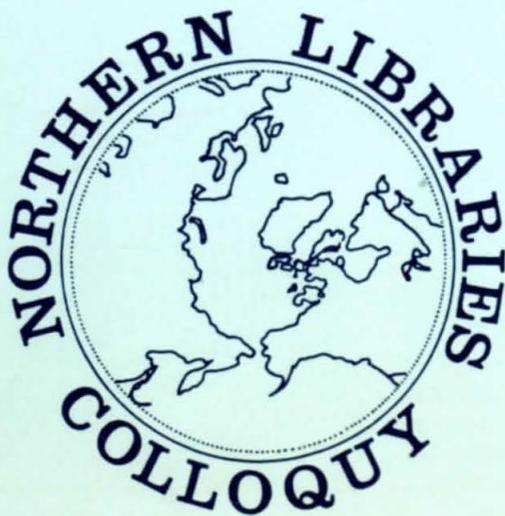


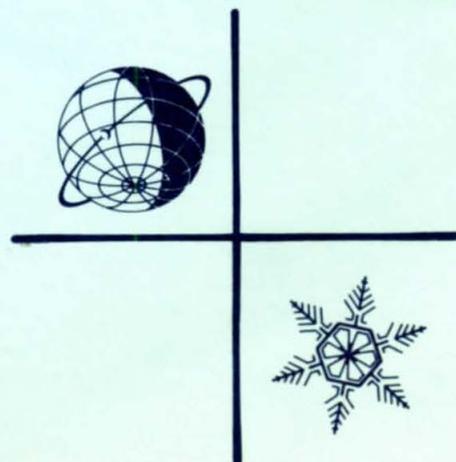
# GLACIOLOGICAL DATA

TWELFTH NORTHERN LIBRARIES COLLOQUY

5-9 JUNE 1988



World Data Center A  
for  
Glaciology  
[Snow and Ice]



August 1988

# **GLACIOLOGICAL** **DATA**

**REPORT GD-22**

**INSTAAR SPECIAL PUBLICATION**

**TWELFTH NORTHERN LIBRARIES COLLOQUY**

**5-9 JUNE 1988**

Edited by

**Ann M. Brennan**

**Martha Andrews**

Published by:

**WORLD DATA CENTER FOR GLACIOLOGY  
[SNOW AND ICE]**

**Cooperative Institute for Research in Environmental Sciences  
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**August 1988**

## DESCRIPTION OF THE WORLD DATA CENTER SYSTEM<sup>1</sup>

The World Data Centers (WDCs) were established in 1957 to provide archives for the observational data resulting from the International Geophysical Year (IGY). In 1958 the WDCs were invoked to deal with the data resulting from the International Geophysical Cooperation 1959, the one-year extension of the IGY. In 1960, the International Council of Scientific Unions (ICSU) Comite International de Geophysique (CIG) invited the scientific community to continue to send to the WDCs similar kinds of data from observations in 1960 and following years, and undertook to provide a revised *Guide to International Data Exchange* for that purpose. In parallel the CIG inquired of the IGY WDCs whether they were willing to treat the post-IGY data; with few exceptions, the WDCs agreed to do so. Thus the WDCs have been serving the scientific community continuously since the IGY, and many of them archive data for earlier periods.

In November 1987 the International Council of Scientific Unions (ICSU) Panel on World Data Centers prepared a new version of the *Guide to International Data Exchange*, originally published in 1957, and revised in 1963, 1973 and 1979. The new publication, *Guide to the World Data Center System, Part 1, The World Data Centers (General Principles, Locations and Services)* was issued by the Secretariat of the ICSU Panel on World Data Centers. This new version of the *Guide* contains descriptions of each of the twenty-seven currently operating disciplinary centers, with address, telephone, telex, and contact persons listed. The reader is referred to the new *Guide* for descriptions of the responsibilities of the WDCs, the exchange of data between them, contribution of data to WDCs, and the dissemination of data by them. The WDCs for Glaciology are listed below.

### World Data Center A for Glaciology [Snow and Ice]

Address:	WDC-A for Glaciology CIRES, Campus Box 449 University of Colorado Boulder, Colorado 80309-0449 USA
Telephone:	(303)492-5171
Telex:	257673 WDCA UR
Telefax:	(303)497-6513
Network Address:	[NSIDC/OMNET] MAIL/USA VAX Mail (via SPAN) KRYOS::NSIDC
Director:	Dr. R.G. Barry

### World Data Center B1

Address: World Data Center B1 for Glaciology  
Molodezhnaya 3  
Moscow 117296  
USSR

Telephone: 130-05-87  
Telex: 411478 SGC SU  
Director: Dr. V.I. Smirnov

### World Data Center C for Glaciology

Address: WDC-C for Glaciology  
Scott Polar Research Institute  
Lensfield Road  
Cambridge CB2 1ER  
UNITED KINGDOM

Telephone: (0223)336556  
Telex: 81240 CAMSPL G  
Network Address: (JANET)ADM13@UK.AC.CAMBRIDGE.PHOENIX  
Manager: Mrs. Ailsa D. Macqueen

The following organization provides international data services including data analyses and preparation of specialized data products. It merges the previous activity of the Permanent Service on the Fluctuations of Glaciers and the Temporary Technical Secretariat for World Glacier Inventory. These activities are not part of the WDC system but the center cooperates with WDCs in the discipline. Users wishing assistance in seeking data or services from this group may contact an appropriate WDC.

### World Glacier Monitoring Service (WGMS)

Dr. W. Haeberli  
Section of Glaciology  
VAW/ETH, ETH Zentrum  
8092 Zurich  
SWITZERLAND

<sup>1</sup>Adapted from *Guide to the World Data Center System. Part 1. The World Data Centers (General Principles, Locations and Services)*. International Council of Scientific Unions. Panel on World Data Centers, November 1987, 91 pp.

## FOREWORD

In this, the 22nd Glaciological Data, we report on the Twelfth Northern Libraries Colloquy, which was held in Boulder, Colorado, June 5-9, 1988, under the cosponsorship of the University of Colorado, Institute of Arctic and Alpine Research and the World Data Center A for Glaciology. The Northern Libraries Colloquy has met since 1971, alternating between Europe and North America. Nearly 80 people from eleven countries attended the Boulder meeting.

The colloquy theme "Northern Information - The Global Connection" served well the rising interest of the scientific community in hemispheric and global environmental change and their societal implications. The polar regions do play an important role in the dynamics of climate and environment, and the papers presented in this volume reflect the polar information community's interest in serving the environmental, scientific, and socioeconomic user needs. To that end, the group decided to change their name to Polar Libraries Colloquy to reflect better the interests and membership of the group.

We want to acknowledge the work of the Colloquy co-conveners, Ms. Martha Andrews and Ms. Ann Brennan. They, as well as INSTAAR and WDC support staff, and the College Inn and Conference Services staff, worked hard to make the meeting a success. Financial support for both the Colloquy itself and for this publication was provided by a National Science Foundation Grant No. DPP-8711944 to the University of Colorado.

R. G. Barry, Director  
World Data Center-A for Glaciology  
[Snow and Ice]

M. F. Meier, Director  
Institute of Arctic and Alpine  
Research

# CONTENTS

Foreword . . . . . v

## Twelfth Northern Libraries Colloquy Boulder, Colorado, 6-9 June 1988

Introduction - Martha Andrews. . . . .	1
Welcome - Jane L. Watterson. . . . .	7
Agenda . . . . .	11
Participants . . . . .	19
Business Meeting Summary . . . . .	23
Recommendations . . . . .	25

## Keynote Address

Towards an Arctic Data and Information System - Juan G. Roederer . . . . .	27
---	----

## National and International Networking of Northern Information

U.S. Arctic Information and Data Activities and the Global Connection - Jerry Brown . . . . .	39
Design for a U.S. National Arctic Information Network - Barbara J. Sokolov . . . . .	43
A Conceptual Framework for a Canadian Polar Information System - Ramma Kamra . . . . .	53
Cooperation--How Much Benefit? - Geza T. Thuronyi and Valerie J. Galpin . . . . .	63

## New Areas of Arctic Research and their Literature

Submarine Exploration of the Arctic - Alfred S. McLaren. . . . .	69
The Library Service at the Swedish Institute of Space Physics in Kiruna - A Center for Mining and Space Research - Inger Bergstrom . . . . .	77
The DOE Arctic and Offshore Research Information System - Harold D. Shoemaker and David L. Chiang. . . . .	85

Lanzhou Geoscience Centre of Chinese Academy of Sciences  
and Its Information Services - Yuan Yuanrong  
and Sung Chengquan . . . . . 99

Databases for Arctic Marine Technology - Joy Tillotson . . . . .101

**Social Science Indexes and Databases**

A Northern Village Under Change: A Study on the Effects  
of Experimental Construction Activities on  
Community in Kilpisjärvi - Kyösti Urponen . . . . .109

University of Alaska - Siberia Medical Research  
Program: Implications for Arctic Libraries  
- Barbara J. Sokolov and Catherine Innes-Taylor . . . . .115

Let Them Read!: The Socio-Political Education of the Indigenous,  
Native Siberian Child - a Didactic and Dogmatic Approach  
to Reading - Tamara P. K. Lincoln . . . . .119

Library Services in Lapland - Erkki Pirjetä and  
Rainer Salosensaari . . . . .131

**Networking of Northern Information - Some Regional Implementations**

✓ The Use of Networks and Local Systems in Large  
Library Systems in the Pacific Northwest  
(Including Alaska) - Sharon M. West . . . . .135

Electronic Mail and Library Cooperation - Eiríkur T.  
Einarsson . . . . .143

Planning an Information Centre on Cold Region Technology  
- Kerstin Ullström Elam . . . . .151

The Merger of the Boreal and ASTIS Databases: Genesis  
of a Canadian Polar Information System - Robin Minion  
and Ross Goodwin . . . . .153

**The Global Connection - The Technical Challenges**

Northern Libraries Colloquy Networking "Links" Survey  
Results - Martha Andrews . . . . .163

The Stefansson Collection: Past, Present, Future  
- Philip N. Cronenwett . . . . .167

OCLC Use in Polar Libraries: A Case Study - Lynn  
B. Lay . . . . .175

Of Lasers, Crabs and Arctic Research - Steven L. Smith . . . . .183

Downloading ASFA CD-ROM for Resource Sharing and Cataloging - Michael J. Gomez . . . . .	.197
Pilot Comprehensive Polar Bibliography Using CD-ROM - Guy G. Guthridge . . . . .	.209
IANI - Intelligent Access to Nordic Information Systems - Inge Berg Hansen and Kjell Birger Hansen . . . . .	.211
<b>Serving the Northern Information User</b>	
World Data Centre "C" for Glaciology: Past, Present and Future - Ailsa D. Macqueen . . . . .	.219
Research into the Biology of Northern Regions at the University of Oulu, Finland - Anna-Maija Mäkirinta and Urho Mäkirinta . . . . .	.223
A Study of Overlap between Geographically Oriented Databases and Subject Oriented Databases - Margo Young and Robin Minion . . . . .	.227
New Approaches to Information Delivery - Yvonne Hinks and Judith A. Carrie . . . . .	.235
Myths or Truths of Northern Information Provision: Some Points for Discussion - Ronald K. Inouye . . . . .	.245
NWT Public Library Services: The Giant Leap to Resource Sharing - Marion L. Pape . . . . .	.251
Arctic/Alaska Gray Literature: Evaluation of Access via Commercial Databases - Barbara J. Sokolov . . . . .	.263
Preliminary Evaluation of the Polar Regions Monographic Collection of the Rasmuson Library, University of Alaska Fairbanks - C. Eugene West . . . . .	.281
<b>Polar Archival and Historical Resources</b>	
The Organization of Polar Information before the Advent of Online Databases: A Review of the Literature - Martha Andrews . . . . .	.289
The Old Company in a New Age: 20th Century Records in the Hudson's Bay Company Archives - Anne Morton . . . . .	.307
Making a Database from the Accession List of the Richardson-Voss Papers at the Scott Polar Research Institute Library Using dBase III - Kerstin Ullström Elam . . . . .	.315

Putting our Honorable Ancestors Online: A Northern  
Adventure - David Hales (abstract only). . . . .321

Arctic Information Available in the "Umberto Nobile  
Documentation Centre" - Gertrude Nobile . . . . .323

## INTRODUCTION

The Twelfth Northern Libraries Colloquy was held in Boulder, Colorado, U.S.A., 5 to 9 June 1988, under the auspices of the University of Colorado, Institute of Arctic and Alpine Research, and the University of Colorado, World Data Center A for Glaciology. The conference was supported by National Science Foundation (NSF) Grant No. DPP-8711944. Nearly 80 people attended from eleven different countries with locations or research interests in polar and cold regions. The conference consisted of papers; a panel discussion; posters; demonstrations; a business meeting; and field trips to the Rocky Mountain National Park, the University of Colorado Mountain Research Station, and the National Center for Atmospheric Research.

### Background

The Northern Libraries Colloquy is an international forum for exchange of information and ideas among the polar bibliographic community. The participants are concerned with libraries and information services relevant to researchers on northern, polar, or other cold regions regardless of subject area covered or geographic location. They are also concerned with all collections located in arctic or subarctic regions regardless of coverage. The group pursues closer cooperation among northern libraries through 1) exchange of information on collections, new acquisitions, and methods of information processing; and 2) coordination of information systems.

The Northern Libraries Colloquy first met at the Boreal Institute of Northern Studies, University of Alberta, 15-17 June 1971. The idea for a colloquy on northern library resources originated with the Director of Library Services, Government of the Yukon Territory and the Librarian of the Arctic Institute of North America. A biennial schedule of meetings evolved, alternating between Europe and North America. The colloquy has no formal structure. Business is carried forward by the host (or hosts) of the meeting, as designated by the last meeting. A list of "members" in the form of a mailing list is maintained, based largely on participation in one or several of the colloquies. Proceedings from all of the colloquies are available. For information on the next colloquy, to be held in Rovaniemi, Finland in 1990, contact should be made with Mr. Juhanni Lillberg (see list of participants for address).

The Twelfth Northern Libraries Colloquy was planned around the theme Northern Information - The Global Connection. This theme was chosen to reflect the intent of the Arctic Research and Policy Act of 1984 (PL 98-373) and to extend its objectives to an international level, thus the global connection concept. The act recognizes the need to support arctic research efforts better by increasing the efficiency of access to data and information. The formation of a national network for northern information was initially addressed in the Arctic Environmental Information Data Center (AEIDC) report to NSF, A National Arctic Information Network (D.M. Hickok, B.J. Sokolov, and R. Dursi, 1987, 2 vol.).

An attempt was made to involve potential North American participants in planning the colloquy, so that something approaching a consensus would be achieved in structuring the program. Balance was sought among the variety of interests encompassed by the basic theme. A planning meeting was held in Washington, 21-23 October 1987, and was attended by Dr. Jerry Brown and Mr. Charles E. Myers from the National Science Foundation, Dr. Geza Thuronyi from the Library of Congress, Cold Regions Bibliography Project, Nancy Liston from the U.S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory, Nita Cooke from the Boreal Institute for Northern Studies, University of Alberta, and the colloquy co-chairpersons, Ann Brennan and Martha Andrews. During the 1987 Arctic Science Conference, Anchorage, Alaska, 24-26 September 1987, a large number of Alaskan librarians were also consulted. Several Canadian librarians and information specialists were asked for their views at two Northern and Offshore Information Resources (NOIR) seminars in Edmonton, Alberta, in November 1986 and in Toronto, Ontario, in April 1987. Thanks are extended to all of these people for their time and ideas.

#### Arrangement of the Proceedings

The opportunity to present a paper or poster around the theme was open to all who wished to submit an abstract in a timely fashion. Thirty-seven papers are included here, among them four papers [Guthridge (p. 209-210), Hansen and Hansen (p. 211-218), Andrews (p. 289-306), and Nobile (p. 323-331)] that were not read at the conference. The conference was opened by a series of short welcomes by the sponsoring institute heads and a representative of the local library community followed by two keynote addresses. The contributed papers, an invited luncheon speech, a panel discussion, posters, and demonstrations were presented during the four days of the colloquy. This volume follows closely the outline of the meeting program reprinted herein.

The colloquy was privileged to have as its two keynote speakers Dr. Juan Roederer, Chair, U.S. Arctic Research Commission, and Dr. Jerry Brown, Head, Arctic Research and Policy Staff, National Science Foundation. Both the Interagency Arctic Research Policy Committee (IARPC) and the Arctic Research Commission (ARC) were authorized under the Arctic Research and Policy Act of 1984 (PL 98-373) and established by Executive Order 12501 (28 January 1985). The National Science Foundation, as lead agency for the IARPC, is responsible for implementing arctic research policy. The Arctic Research Commission assists the IARPC in the development of arctic research policy.

Dr. Roederer's address on data versus information and issues concerning an arctic data and information system broached nearly all of the questions that were brought before the colloquy during the week. "Interactive data centers where scientists congregate to work with a common data base cooperatively and in computer-interactive form will become a necessity." This was the vision he placed before the colloquy.

Dr. Brown outlined relevant activities underway in connection with the Arctic Research and Policy Act and brought a charge to the colloquy to come up with "next steps" or specific recommendations for an increasing commitment toward an international polar information network. This address introduced a session of papers dealing with some ongoing and proposed activities in the area of national and international networking of polar information.

In addition to the papers specific to the theme of networking of northern information, several subthemes were represented on the program. The topics covered were varied and of considerable interest as the basis on which the proposed network must reside. Concerns of the end-user such as library services, identification of information sources, and delivery of information were addressed. Coverage of the literature of the social sciences and new areas of arctic research were considered. Current approaches to information provision through both local and regional online cataloging facilities were explored. Insights on all of these topics and others, such as polar archival resources, were shared.

#### Accomplishments of the Colloquy

What was accomplished by this colloquy? Did it achieve the goals stated in the original proposal to NSF. Did it address the reviewers' comments and concerns on the proposal? The comments below are made with reference to the papers in this volume insofar as possible. Unfortunately, discussions could not be recorded fully except at the business meeting, but some reference to them is necessary. Reference to the papers will be by authors' last names and page numbers only.

One proposed topic eventually excluded was digital (non-bibliographic) data. This subject was pre-empted by the meeting of The Arctic Environmental Data Workshop in Boulder, 21-24 March 1988. Communications between this group and the Northern Libraries Colloquy will be fostered by the participants common to both groups. Also not forthcoming at this colloquy was an evaluation of the present status and future needs of bibliographical coverage of the literature in the social sciences. Suggestions have been made (pers. comm. M. Andrews to A. McCartney, May 9, 1988) for this topic to receive further attention at the Sixth Inuit Studies Conference, Copenhagen, 17-20 October 1988. Likewise, the problem of inadequate bibliographic coverage of certain types of publications was covered only in terms of the "gray" literature (see Sokolov, p. 263-280).

The areas in which the colloquy is seen to have achieved its mission are as follows:

1) Did the colloquy promote networking plans? The colloquy generated much discussion on this point. The paper by Thuronyi and Galpin (p. 63-67) describes an experimental cooperative arrangement that is shown to reduce effort and improve coverage of polar literature. This cooperative structure could be expanded - "Ultimately we might see the COLD database [internationally accessible] as the joint product of a number of specialist polar information systems . . ." The geneses of possible national networks were presented by Sokolov (p. 43-51), Kamra (p. 53-62), and Minion and Goodwin (p. 153-161). The Panel Discussion among the producers of ASTIS, BOREAL, COLD, and SPRI (the four online "cold regions" databases) touched on areas of possible cooperation.

2) Did a network design emerge from the meeting? In discussions, both informal and at the business meeting, the challenges facing a definitive network were aired. As at previous colloquies where this topic has been addressed, the obstacles identified were 1) financial support and 2) a coordinating mechanism. Practical limitations imposed by both information

specialists and funding agencies led to suggestions that reallocation of present resources might be a solution to the problem of financial support. A coordinating mechanism is still not in place. However, it should use every opportunity to build on present network elements, especially through cooperation and specialization. An appropriate approach for further cooperative efforts is outlined in Business Meeting Recommendation 3 (A PROPOSED PLAN OF ACTION FOR PARTICIPANTS OF THE NORTHERN LIBRARIES COLLOQUY). Implementation of some parts of this recommendation will take place immediately (see further discussion below).

3) Did the colloquy address the information goals set forth in the Arctic Research and Policy Act of 1984 (ARPA)? See papers by Brown (p. 39-42), Sokolov (p. 43-51), and Guthridge (p. 209-210). Certainly the colloquy has demonstrated its ability to be the vehicle for the promotion of ARPA's objectives in the area of information networking. The U.S. Arctic Research Plan is committed to conveying arctic research results to users (see Guthridge's footnotes, p. 210).

4) Did this colloquy benefit the scientific community? The ways in which information networking could benefit the scientific community (and indeed the whole user community) have probably not been addressed adequately. There is evidence that the databases now being produced are being used very little in relation to their potential [see Hansen and Hansen (p. 211-218), and Andrews (p. 163-166)]. The reasons for this should be explored and resolved quickly. Meanwhile greater contact between information professionals and their user communities should be fostered. Business Meeting Recommendation 3.j. (p. 26) addresses this point.

5) Did the colloquy shed any light on the problems of complementary coverage (overlap) among the online databases? The extent and consequences of database overlap were dealt with by Thuronyi and Galpin (p. 63-67), Tillotson (p. 101-108), Sokolov (p. 263-280), and Young and Minion (p. 227-234). There is little doubt that overlap exists and will continue to do so although its reduction could provide cost savings to the various producers. The user must therefore search several (often five or six) databases on several vendors for every thorough search. But this is not being done, thus both the user and the producer are being short-changed. The intelligent access system or gateway (Hansen and Hansen, p. 211-218) is a logical, if expensive, solution.

6) What new technologies were explored which would assist in an international polar bibliographical network? New and nearly new technologies offer many possibilities.

The major online cataloging utilities (OCLC, RLIN AND WLN) all include polar bibliographic records, mainly monographic [see the papers by Lay (p. 175-181), Cronenwett (p. 167-174), and S. West (p. 135-141)]. Should colloquy "members" be encouraged to join one of these; if so which one (see Business Meeting Recommendation 3.f. p. 26)?

What about CD-ROM as a storage medium for a composite polar bibliography (see Guthridge, p. 209-210)? The Western Library Network (WLN), which includes the monographic holdings of all of the large Alaskan libraries, was demonstrated on CD-ROM by R. Brandis. Other possible uses of this storage medium were also presented [Smith (p. 183-196) and Gomez (p. 197-207)].

Electronic mail use by colloquy "members" was surveyed (Andrews, p. 163-166). Einarsson (p. 143-150) recommended common use of Omnet/ScienceNet since polar research workers already use this system.

7) What recommendations did the colloquy make? As can be seen from reference to the Business Meeting Recommendations in this volume (p. 25-26), three recommendations were approved.

The first supported the establishment of a Canadian Polar Information System.

The second resulted in a name change for the colloquy to Polar Libraries Colloquy to more accurately reflect the representation of the group.

The third, and longest recommendation is A PROPOSED PLAN OF ACTION FOR PARTICIPANTS OF THE NORTHERN LIBRARIES COLLOQUY. This recommendation is designed to promote action on the goals of the colloquy. A working group is proposed, with institutional rather than personal membership. The working group would initiate several tasks designed to formalize a Polar Information Network and coordinate these tasks with those recommended tasks already in progress by various institutions and individuals.

The approval of this last recommendation by the colloquy demonstrates its importance. Implementation of this recommendation, without support of the national governments involved in polar research and development, is improbable. This colloquy has demonstrated the already substantial progress made by the "member" institutions toward an international polar information network. Now is the time for the necessary support to be given to the colloquy to coordinate these efforts.

#### Acknowledgements

The editors wish to thank Kathleen Salzberg, Robin Paulson, Margaret Ahlbrandt, John Andrews, and John Hollin from the Institute of Arctic and Alpine Research; Claire Hanson, Pat Hofman, Margaret Strauch, Carol Pedigo, and Patti Ehmsen of the World Data Center A for Glaciology; and Cassandra Volpe of the University's Western Historical Collections for their help in making the Twelfth Northern Libraries Colloquy a success. The Graduate School of the University of Colorado funded the Heritage Center reception, and National Science Foundation Grant No. DPP-8711944 supported Colloquy preparations, participants, and these Proceedings.

Martha Andrews

# Welcome

Jane L. Watterson  
National Oceanic and Atmospheric Administration  
Boulder, Colorado, USA

Welcome . . . defined as gladly and cordially received: as, a welcome guest. You are welcomed here this morning to Colorado and to Boulder - guests in our state, city and institutions.

Welcome . . . defined as agreeable or gratifying as, welcome news. I am sure those of you in the northern information business find it "welcome news" that these meetings you have sponsored are continuing and flourishing.

Welcome . . . defined as freely and willingly permitted or invited to use: as, you are welcome to (use my car) according to Webster's definition, but perhaps, in the context of this meeting the example should be you are welcome to use my information and my information resources.

Welcome . . . defined as a conventional response to thanks, meaning under "no obligation for the favor given". Given the straitened circumstances many information providers experience today, perhaps this definition carries the most meaning. We share and help each other, and often all we can say is "thanks" and "you're welcome".

You have had welcomes this morning from your colleagues and your peers. This welcome is from an information professional on the fringes of your specialty.

There is some irony in my having been asked to participate in this program. My first job when graduating from college was in the library of the Office of the Chief of Engineers in Washington, D.C. Then, as now, OCE was parent to cold regions research. The irony is that in those days preceding air conditioned offices, Washington operated under a comfort index that dismissed employees when the temperature and humidity reached a certain level. My very first day on the job we were dismissed because of the high temperature and humidity. Now, some thirty years later in the cooler and drier climate of Colorado, I am welcoming northern information users and providers, some of whom relate to my first employer, OCE, through CRREL, to their twelfth Colloquy.

As I thought about comments for this talk I thought "there has to be a message in this irony". And the message is, I think, information and the need

for information endures. Format changes, access changes, working conditions change. Those 1950s World War I temporary buildings that housed the OCE library have finally gone to their reward. The basic premise remains the same. People need information. Your meeting here this week supports this premise. In addition, a glance at your program shows that this need is universal. The diversity of topics within a topic, the centers represented, and the global span they represent would, no doubt, seem mind boggling to the lay person seeking information but who has no notion of how such information is derived or disseminated.

A speaker to the Rocky Mountain Chapter of Special Libraries Association (SLA) last year entitled her talk "Solar Weather - Why do we Care". I have paraphrased the title to read "northern information - why do we care".

You know why you care. I mentioned earlier that I am on the fringes of your specialty. Let me tell you why I and my library care.

I am with the National Oceanic and Atmospheric Administration (NOAA) Library here in Boulder. It sounds as though our interests should be oceans and atmospheres - right? Wrong. We provide information service to NOAA, the National Bureau of Standards (NBS) laboratories here in Boulder, and to the Institute of Telecommunication Sciences of the National Telecommunications and Information Administration. What is important about "northern or cold" information to us? Well, NBS studied the welds on the Alaskan pipeline some years ago. We provided searches from the COLD data base for the metallurgists on that project. On the fringes? Yes. Do we search the data base everyday? No. Important to our users at the time? Most definitely, yes.

NOAA interested in cold you ask? Who of you here has not watched the Arctic air mass dipping over your part of the country and your television screen on the nightly weather report? Weather researchers use your cold information. On the fringes? Yes. Do we search your data bases everyday? No. Important when we need it? Most definitely, yes.

The Institute for Telecommunication Sciences needs your information? What effects do polar ionospheric conditions have on satellite communications? On the fringes? Yes. Search you data bases everyday? No. Important when we need it? Most definitely, yes.

Are we interested? Do we care? Yes. The interesting demonstration of this interest is that when we received the preliminary announcements about this meeting several months ago, we, on our reference staff, said "doesn't this sound great?" And promptly sent back the form that said keep us informed. Then, when more detailed programs came, we said "oh, doesn't that session sound good?" or "I'd like to go to that one." If we on the fringes are excited about this meeting, you in the center (does north have a center) must be ecstatic.

I am referred to in your program as past president of the Rocky Mountain Chapter of the Special Libraries Association which is having its annual conference in Denver next week. Some of you are, likely, members of SLA and may be attending the conference. When Martha Andrews and I met to discuss this program, we talked about these memberships and your areas of very specialized information interests within the special libraries/information

centers community. Where do you fit in the scheme of things? Are you legitimate, I think was the word she used, in this scheme? The question, perhaps, is not legitimacy so much as awareness.

Perhaps you've been hiding your light under a bushel. For those of you who can, I encourage you to participate in the large organizations such as SLA (which has international chapters). More of us in special libraries need to know more about those of you in very special libraries. As an aside, if any of you are interested in the SLA program next week, contact Martha or me. You are welcome to share in the information we have about it. If you are having an identity crisis about where you fit in the information world, participation in the larger organizations will help with problems of being perceived as detached from the rest of us. As you have demonstrated with your global program information needs know no geographic boundaries.

Welcome . . . defined as an act or expression of welcoming: as, a hearty or (cold) welcome. We will presume today that cold welcome has a warmer meaning than Webster may have intended.

Welcome . . . defined as an expression of cordial greeting.

Welcome . . . defined as to greet with pleasure and hospitality.

Most definitely I bid you welcome with pleasure and hospitality to Boulder and the twelfth Northern Libraries Colloquy.

# PROGRAM

## Sunday, June 5th

- 5:00 - Registration and Buffet Supper  
8:00 p.m. College Inn Conference Center

## Monday, June 6th

- 8:00 am Registration  
8:30 am Welcome by Colloquy  
Co-Chairpersons Martha Andrews, INSTAAR  
Ann Brennan, WDC-A for  
Glaciology  
8:45 am Introduction Dr. Mark Meier  
Director, INSTAAR  
9:00 am Introduction Ronald L. Weaver  
WDC-A for Glaciology  
9:15 am Introduction Jane Watterson,  
Past President, Rocky Mt.  
Chapter, SLA  
9:30 am Keynote Address Dr. Juan Roederer  
"Toward an Arctic Data and  
Information System" Chair, U.S. Arctic  
Research Commission

COFFEE BREAK - 10:00 - 10:30 am

## SESSION 1 - THE U.S. ARCTIC RESEARCH AND POLICY ACT OF 1984: NATIONAL AND INTERNATIONAL NETWORKING OF NORTHERN INFORMATION

Chairperson: Valerie Galpin, Scott Polar Research Institute, UK

- 10:30 am Keynote Address Dr. Jerry Brown, Head  
"Role of the U.S. Arctic Arctic Research &  
Research and Policy Act Policy Staff, NSF  
in Northern Information"  
11:00 am Design for a U.S. National Barbara Sokolov  
Arctic Information Network AEIDC, Anchorage AK  
11:20 am A Conceptual Framework for Ramma Kamra  
a Canadian Polar Information Indian and Northern  
System Affairs, Ottawa,  
Canada  
11:40 am Cooperation -- How Much Benefit? Geza Thuronyi, U.S.  
Library of Congress  
V. Galpin, SPRI, UK

## Monday Noon

- 12:00 - Luncheon Guest Speaker Dr. A.S. McLaren  
1:15 pm "Submarine Exploration of the CIRES, University  
Arctic" of Colorado

Monday, June 6th

SESSION 2 - NEW AREAS OF ARCTIC RESEARCH AND THEIR LITERATURE

Chairperson: Sharon West, Elmer E. Rasmuson Library, Univ. Alaska

- |         |  |  |
|---------|--|--|
| 1:20 pm | The Library Service at the Swedish Institute of Space Physics in Kiruna - A Center for Mining and Space Research | Inger Bergström<br>Institute of Space Physics, Kiruna, Sweden          |
| 1:40 pm | The DOE Arctic and Offshore Research Information System  | Harold Shoemaker, DOE,<br>Morgantown, WVA, USA<br>D. Chiang, SAIC, USA |
| 2:00 pm | Lanzhou Geoscience Centre of Chinese Academy of Sciences and Its Information Services                            | Yuan Yuanrong<br>Lanzhou Institute of Glaciology, China                |
| 2:20 pm | Databases for Arctic Marine Technology   | J. Tillotson, CISTI<br>Marine Br., Canada                              |

COFFEE BREAK - 2:40 - 3:00 pm

SESSION 3 - SOCIAL SCIENCE INDEXES AND DATABASES

Chairperson: Marvin Falk, Elmer E. Rasmuson Library, Univ. Alaska

- |         |   |  |
|---------|---|--|
| 3:00 pm | Northern Village Under Change: A Study on the Effects of Experimental Construction Activities on Community in Kilpisjärvi               | Kyösti Urponen<br>Univ. Lapland<br>Finland                               |
| 3:20 pm | University of Alaska - Siberia Medical Research Program: Implications for Arctic Libraries  | C. Innes-Taylor, UAK Library<br>B. Sokolov, AEIDC, Anchorage,<br>AK, USA |
| 3:40 pm | Let Them Read: The Socio-Political Education of the Indigenous, Native Siberian Child: A Didactic and Dogmatic Approach to Bibliography | Tamara Lincoln,<br>Elmer E. Rasmuson Library,<br>UAK, USA                |
| 4:00 pm | Library Services in Lapland   | R. Salosensaari<br>E. Pirjetä<br>Rovaniemi Public Library,<br>Finland    |

Monday Evening

- |         |  |
|---------|--|
| 6:00 -  | Reception at the Heritage Center, Old Main, Campus,  |
| 7:00 pm | Campus, Sponsored by the Graduate School, Office of the Dean,<br>University of Colorado at Boulder |

7:45 - Steak Dinner, 5th Floor Terrace, UMC, Campus,  
9:45 pm Live Folk and Bluegrass Music!

Tuesday, June 7th

SESSION 4 - INFORMATION CENTER TOURS; FIELD TRIP TO ROCKY MOUNTAIN NATIONAL PARK; TOUR AND BANQUET AT THE MOUNTAIN RESEARCH STATION OF THE UNIVERSITY OF COLORADO

8:00 am Buses leave College Inn for East Campus tours and Field Trip -  
DRESS FOR COLD WEATHER

8:10 - Tour of the Institute of Arctic and Alpine Research including the  
10:00 am Reading Room (Library)  
Guide: Martha Andrews

Tour of the World Data Center A for Glaciology,  
including Information Center and DMSP  
Guide: Ann Brennan

COFFEE WILL BE SERVED AT INSTAAR

10:00 am Leave for Rocky Mountain National Park  
Field Trip Guides: (will switch buses midway)  
John Andrews, Dept. of Geological Sciences  
Cassandra Volpe, Western Historical Collections,  
University of Colorado Libraries

11:30 am Arrive at Rocky Mountain National Park. Time will be taken to  
consume box lunches, stop at Visitor's Center, and drive up Trail  
Ridge Road (highest continuous paved road in the country).

2:45 pm Return to town of Estes Park, time to shop!

3:15 pm Leave Estes Park on Peak-to-Peak Highway

4:30 pm Arrive at the University of Colorado Mountain  
Research Station, 2880 m.a.s.l. Time to walk around and have a  
tour after the Banquet!

7:00 pm Board buses and return via Boulder Canyon

7:45 pm Arrive back at the College Inn

Wednesday, June 8th

SESSION 5 - NETWORKING OF NORTHERN INFORMATION - SOME REGIONAL IMPLEMENTATIONS

Chairperson: G.A. (Nita) Cooke, Boreal Institute for Northern Studies, Univ.  
Alberta, Edmonton, Alberta

8:30 am The Use of Networks and Local Systems in Large Library Systems in the Pacific Northwest (including Alaska) Sharon West,  
Elmer E. Rasmuson Library,  
UAK, USA

- |         |  |   |
|---------|--|---|
| 8:50 am | Electronic Mail and Library Cooperation  | Eirikur Einarsson<br>Marine Res. Inst.,<br>Iceland                            |
| 9:10 am | Planning an Information Center on Cold Region Technology                                     | K. Ullström Elam<br>Luleå University, Sweden                                  |
| 9:30 am | The Merger of the BOREAL and ASTIS Databases: Genesis of a Canadian Polar Information System | R. Minion, BINS,<br>Edmonton, Canada;<br>R. Goodwin, AINA,<br>Calgary, Canada |

COFFEE BREAK - 10:00 - 10:30 am

**SESSION 6 - NORTHERN INFORMATION - THE GLOBAL CONNECTION - THE TECHNICAL CHALLENGES**

Chairperson: Nancy Liston, Cold Regions Res. & Eng. Lab., USA

- |          |   |   |
|----------|---|---|
| 10:30 am | The Stefansson Collection: Past, Present, Future  | P.N. Cronenwett<br>Dartmouth College,<br>Hanover, USA     |
| 10:50 am | OCLC Use in Polar Libraries: A Case Study   | L. Lay, Byrd Polar<br>Res. Center, Ohio St.<br>Univ., USA |
| 11:10 am | Of Lasers, Crabs and Arctic Research  | S. Smith,<br>Elmer E. Rasmuson Library,<br>UAK, USA       |
| 11:30 am | Downloading ASFA CD-ROM and Online Databases for Internal Library Purposes and for the Creation of the Library's Online Catalog | Michael Gomez<br>Alfred-Wegener Inst<br>F.R. Germany      |

LUNCH 12:00 - 1:00 pm

Wednesday, June 8th

**SESSION 7 - PANEL DISCUSSION**

Moderator: Paul McCarthy, Elmer E. Rasmuson Library, Univ. of Alaska

1:00 - Online Databases Accessible Internationally  
2:00 pm Panel:

Valerie Galpin, SPRILIB  
Scott Polar Research Institute, UK  
Nita Cooke, BOREAL  
Boreal Institute of Northern Studies, Canada  
Ross Goodwin, ASTIS  
Arctic Institute of North America, Canada  
Nancy Liston, COLD  
Cold Regions Res. & Engineering, Lab., USA

**SESSION 8A - POSTER SESSION - BUFFALO ROOM**

- |                   |  |   |
|-------------------|--|---|
| 2:00 -<br>3:00 pm | Northern Cartoons  | Nita Cooke, BINS,<br>Edmonton, Canada                       |
|                   | World Data Centre "C" for<br>Glaciology: Past, Present<br>and Future                   | Ailsa Macqueen<br>WDC-C, Glaciology,<br>SPRI, Cambridge, UK |
|                   | Research into the Biology of<br>Northern Regions at the<br>University of Oulu, Finland | A.-M. and Urho Mäkirinta,<br>Univ. of Oulu, Finland         |

COFFEE BREAK - 3:00 - 3:30

**SESSION 8B - DEMONSTRATIONS**

- |                   |  |   |
|-------------------|--|---|
| 3:30 -<br>4:30 pm | Lasercat (WLN on CD-ROM)<br>Demonstration                        | Rush Brandis, Western Library<br>Network, USA                 |
|                   | ASTIS and other Northern<br>Databases available on QL<br>Systems | Ross Goodwin, AINA, Calgary,<br>Canada                        |
|                   | AORIS Demonstration  | L. Zuber, SAIC, USA   |
|                   | Alaska Information Online  | M. Falk & R. Inouye<br>Elmer E. Rasmuson<br>Library, UAK, USA |

Thursday, June 9

**SESSION 9 - SERVING THE NORTHERN INFORMATION USER**

Chairperson: Judy Carrie, Information Group West, Calgary, Alta.

- |         |  |  |
|---------|--|--|
| 8:30 am | A Study of Overlap Between<br>Geographically Oriented<br>Databases and Subject<br>Oriented Databases | Margo Young, Sci/Tech Library<br>R. Minion, BINS<br>U. Alberta, Canada |
| 8:50 am | New Approaches to Information<br>Delivery  | J. Carrie, IGW<br>Y. Hinks, AINA,<br>Calgary, Canada                   |
| 9:10 am | Myths or Truths of Northern<br>Information Provision:<br>Some Points for Discussion                  | Ron Inouye,<br>Elmer E. Rasmuson Library,<br>UAK, USA                  |
| 9:30 am | N.W.T. Public Library<br>Services: The Giant Leap<br>to Resource Sharing                             | M.L. Pape, NWT Public Library<br>Service, Canada                       |

COFFEE BREAK - 9:50 - 10:10 am

- 10:10 am Arctic/Alaska Gray Literature: B. Sokolov, AEIDC,  
Evaluation of Access via Anchorage, AK, USA  
Commercial Databases
- 10:30 am Preliminary Evaluation of the Eugene West,  
Polar Regions Monographic Elmer E. Rasmuson Library,  
Collection of the Rasmuson UAK, USA  
Library, UAK, Fairbanks

**SESSION 10 - POLAR ARCHIVAL AND HISTORICAL RESOURCES**

Chairperson: Paul McCarthy, Elmer E. Rasmuson Library, Univ. AK

- 10:50 am The Old Company in a New Age: Anne Morton, HBC Archives,  
20th Century Records in the Winnipeg, Canada  
Hudson's Bay Company Archives
- 11:10 am Making a Database from the K. Ullström Elam  
Accession List of the Luleå University  
Richardson-Voss Papers at Sweden  
SPRI Library Using DBase III
- 11:30 am Putting our Honorable Ancestors David Hales,  
On-Line: a Northern Adventure Elmer E. Rasmuson Library,  
UAK, USA

Thursday, June 9th

LUNCH 12:00 - 1:00 pm

COLD Demonstration

Bill Funderburk  
ORBIT, Houston, USA

**SESSION 11 - BUSINESS MEETING AT COLLEGE INN FOLLOWED BY A TOUR OF NCAR  
(NATIONAL CENTER FOR ATMOSPHERIC RESEARCH) INCLUDING THE LIBRARY**

- 1:00 - 12TH NORTHERN LIBRARIES COLLOQUY BUSINESS MEETING  
3:00 Chairperson: G.A. (Nita) Cooke, Boreal Institute for Northern  
Studies, Univ. Alberta, Edmonton, Alberta

Agenda for the Business Meeting:

1. Polar and Cold Regions Library Resources: A Directory
2. Northern Libraries Bulletin
3. Bank Account
4. NLC Proceedings and Brochure
5. Thirteenth Northern Libraries Colloquy
6. Site Selection
7. NLC Networking "Links" Survey Results (M. Andrews)
8. UAK - McGill - Copenhagen Circumpolar Studies Initiative (P. McCarthy)
9. Union List of Serials for Polar Libraries
10. Formal Organization of the Colloquy

11. Recommendations from Twelfth Northern Libraries

Colloquy:

- a) Support establishment of Canadian Polar Information System (Y. Hinks)
- b) Colloquy name change (D. Walton)
- c) Plan of action (P. McCarthy)

12. Other Business

COFFEE BREAK 3:00 - 3:30

3:30 pm Bus leaves the College Inn

3:45 - NCAR TOUR  
4:45 pm

5:00 pm Return to College Inn by bus

Friday, June 10th

8:00 am Bus leaves for Flagstaff Mountain  
Farewell Breakfast Cookout

10:00 am Bus returns to College Inn

## KEY TO ACRONYMS USED IN THIS PROGRAM

AEIDC - Arctic Environmental Information Data Center  
AINA - Arctic Institute of North America  
AORIS - Arctic and Offshore Research Information System  
ASFA - Aquatic Sciences and Fisheries Abstracts  
ASTIS - Arctic Science and Technology Information System  
BINS - Boreal Institute for Northern Studies  
BOREAL - Online database of Boreal Institute for Northern Studies  
CD-ROM - Compact Disc Read Only Memory  
CIRES - Cooperative Institute for Research in the Environmental Sciences  
CISTI - Canada Institute of Scientific and Technical Information  
COLD - Online database containing the Bibliography on Cold Regions Science & Technology and the Antarctic Bibliography  
DMSP - Defense Meteorological Satellite Program  
DOE - [U.S.] Dept. of Energy  
DPP - Dept. of Polar Programs, NSF  
HBC - Hudson's Bay Company  
IGW - Information Group West  
INSTAAR - Institute of Arctic and Alpine Research  
NSF - [U.S.] National Science Foundation  
OCLC - Online Computer Library Center, Inc.  
ORBIT - Search Service, originally for SDC (System Development Corporation),  
now for Pergamon/Infoline  
QL Systems - started as QUIC/LAW Project  
SAIC - Science Applications International Corporation  
SLA - Special Libraries Association  
SPRI - Scott Polar Research Institute  
SPRILIB - Scott Polar Research Institute Library Online Database  
UAK - University of Alaska  
UMC - University Memorial Center, Univ. Colorado Campus  
WDC-A - World Data Center A for Glaciology  
WDC-C - World Data Centre C for Glaciology  
WLN - Western Library Network

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## BUSINESS MEETING SUMMARY

Chaired by G.A. (Nita) Cooke, Boreal Institute for Northern Studies,  
University of Alberta, Edmonton

### 1. *Polar and Cold Regions Library Resources: A Directory*

Currently the *Directory* resides on a word processor at the Boreal Institute. Updates are being made and the revised edition will be available in the autumn. Paper copies will be available from BINS; microfiche from AEIDC.

### 2. *Northern Libraries Bulletin*

Nancy Lesh, University of Alaska, Anchorage, succeeded Phyllis DeMuth as editor of the *Bulletin* upon DeMuth's retirement.

One issue, April 1988, has been published since the change. Currently there are 158 names on the mailing list and copies are sent free upon request. Cost of printing and mailing the April 1988 issue, no. 36, was \$1.11 per copy.

There was discussion about both costs and mailing lists - whether to charge a subscription fee or keep it free; to keep the mailing lists open or restricted. No decisions were made. The sentiment seemed to be to continue the *Bulletin* as before. If costs do become too much of a burden for UAA, N. Liston, CRREL, offered to mail the *Bulletin* using the frank and A. Brennan, WDC-A, offered to assume responsibility for the entire process from compiling to mailing. These offers will be conveyed to N. Lesh.

Thanks from the Colloquy were voted to N. Lesh, the new editor.

### 3. Bank Account

The NLC account is held in an account at the University of Alberta, growing by about \$100 Canadian per year. Current value is approximately \$1200 Canadian. In view of G.A. Cooke's retirement, it was agreed that signatories on the account should be Ross Goodwin, AINA, as now, and add Robin Minion, BINS, to replace Cooke.

### 4. Brochure

The present brochure, designed by a committee appointed at the 11th Colloquy, G., Thuronyi, S. West, A. Goodwin, needs alteration to be used generically. This should be a simple procedure and then publicity material would be available between Colloquies.

5. Union List of Serials for Polar Libraries

There was general agreement that such a list would be useful. Sharon West offered to use her serials list as a base and add others' lists to it to see if there is a great deal of duplication and to determine the scope of the project. October 1 was set as the deadline to send Serials Lists to U. of Alaska, Fairbanks.

6. Thirteenth Colloquy

Juhanni Lillberg, Arktisen Keskuksen Saatio, Rovaniemi, Finland, issued an invitation for the 13th Colloquy to be held in Rovaniemi, June 1990, sponsored by Lapland University Library, Rovaniemi Public Library, and the Lapland Regional Library. The invitation was accepted.

7. Site Selection

The Colloquy has alternated between North America and Europe, and this will probably continue until another area (i.e. Australia, Asia, etc.) is ready to invite the Colloquy. P. McCarthy, U. of Alaska, and P. Cronenwett and N. Liston, Hanover, NH, expressed interest in issuing an invitation at the 1990 meeting for the 1992 Colloquy.

8. NLC Networking Links

Martha Andrews reviewed the responses to the "Links" survey which was completed by over 30 of the NLC participating organizations. The summarized results are published in this volume.

9. UAK-McGill-Copenhagen Circumpolar Studies Initiative

The agreements between the University of Copenhagen, Denmark and the University of Alaska, Fairbanks and between Copenhagen and McGill University, Montreal were discussed. The agreements seek to foster cooperation in arctic studies, including exchange of publications and bibliographic indexes.

10. Formal Organization

A lively discussion of the advantages and disadvantages of a formally structured organization took place. Some of the advantages suggested were: projects could have continuity; lend political clout; help to win grants and raise funds; increase visibility. Among the disadvantages were: loss of independence and flexibility; need for dues, formal membership. The move to formally organize failed - Yes-11, No-28, with 7 Abstentions.

## RECOMMENDATIONS

Three formal recommendations were presented and approved at the 12th Northern Libraries Colloquy.

1. Support the establishment of a Canadian Polar Information System.

"Whereas the theme of the 12th Northern Libraries Colloquy is Northern Information - The Global Connection, be it resolved that the Colloquy supports the establishment of a Canadian Polar Information System, to enable future cooperation in an international polar information network."

Proposed by Yvonne Hinks and Ross Goodwin  
Seconded by Robin Minion

2. Colloquy name change.

"Whereas the Northern Libraries Colloquy has, by now, been recognized as the focal point for exchange of northern information, it is proposed that consideration be given to changing its name to Polar Information Colloquy, in order that:

- (a) The Antarctic information community be encouraged to use this Colloquy as the forum for exchange of ideas instead of forming another similar group; and
- (b) that a polar, rather than an arctic, dimension be encouraged in the Colloquy's deliberations."

Proposed by Canada (Ramma Kamra)  
U.K. (David Walton)  
Seconded by Australia (Evlyn Barrett)

After discussion, the proposal was amended so that the name was to be the Polar Libraries Colloquy. In this version, the proposal was approved. The name change was to be effective with the 1992 Colloquy. The name for the 1990 Colloquy was to be at the discretion of the Finnish hosts.

3. Plan of action.

A PROPOSED PLAN OF ACTION FOR PARTICIPANTS OF THE NORTHERN LIBRARIES COLLOQUY (NLC)

VISION: To provide easy and effective access to all polar-related bibliographic data bases, expand data base coverage to subject or geographic areas not adequately covered, minimize the need for duplicate effort and develop dependable links to other international institutions that provide bibliographic data bases in order to expand access and ease of use.

RECOMMENDATION: Establish within NLC a group to work on a proposed Polar Information Network design. Representation on the working group would be as a representative of an institution, not as an individual.

CONSIDERATIONS:

- a. Appraise currently available data bases in terms of subject areas covered, materials covered (by source, journals, etc.), currency, cost, and ease of access. Evaluation to be conducted by the producer of each database using a centrally developed instrument.
- b. Appraise more carefully current users of polar information and their current and future needs. Begin with an analysis of current database users and then expand to a full market analysis.
- c. Develop and encourage an E-mail network among polar libraries in order to promote further cooperation and assistance.
- d. Consider/negotiate further coverage of polar topics and the elimination of duplicate efforts through more cooperative and distributed responsibility for data base development and entry both nationally and internationally.
- e. Work toward a common data base design in terms of:
  - record structure
  - bibliographic elements
  - automated records
  - similar or common search strategies
  - subject terms/thesaurus.
- f. Encourage polar libraries to become a member of one of the national bibliographic utilities.
- g. Seek informal and then, formal relationships with the appropriate national and international scientific and academic organizations, commissions, and forums that share a focus on the polar regions (i.e. ACUNS, ARC) to both seek support and provide expert advice.
- h. Develop more effective mechanisms to capture "gray" literature and have it represented in current or future polar-related data bases through coordinated efforts.
- i. Seek more effective means for the distribution of polar information through a facilitated network design, one or more large integrated data bases, or, a CD-ROM product from one vendor through which several polar data bases could reside and be made available.
- j. Seek the development of a similar nationally oriented groups within PLC which would become a subset of the more formally organized steering group.

ENDORSED AT THE BUSINESS MEETING OF THE NORTHERN LIBRARIES COLLOQUY, BOULDER, COLORADO, JUNE 9, 1988.

# Toward an Arctic Data and Information System

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## Introduction

The Arctic Research and Policy Act of 1984 states in its Findings that "better dissemination of research data and information is necessary to increase the efficiency and utility of national arctic efforts", and it directs the Arctic Research Commission "to suggest methods for improving efficient sharing and dissemination of data and information on the Arctic among interested public and private institutions". It further directs the Interagency Arctic Research Policy Committee "to promote federal interagency coordination of all arctic research activities...including the sharing of data and information".

As a result, several initiatives on arctic data and information were launched in recent years under the sponsorship of federal agencies, the Interagency Arctic Research Policy Committee and the Arctic Research Commission. These initiatives included the Northern Information Networking Conference held in Anchorage, Alaska, November 18-20, 1985; a report published by Hickok et al. (1987); the Arctic Environmental Data System Workshop that took place in Boulder, Colorado, March 19-25, 1988; and the establishment of a Data and Information Subcommittee by the Arctic Research Commission to propose recommendations on arctic data and information policy.

This article deals with a series of basic issues and questions that must be addressed and answered before any specific recommendations are made regarding "methods for improving the efficient sharing and dissemination of data and information on the Arctic among interested public and private institutions". The expression "Arctic Data and Information System" used throughout this article is defined as the conglomerate of technical resources publicly available to locate and obtain scientific data, published materials and information on past, current and planned research activities, related to the

Arctic. It is not my intention to describe the structure and operation of such a system, nor to present arguments for its establishment as a centralized "brick-and-mortar" institution.

The purpose of the first two chapters is to discuss some basic concepts that warrant clarification, such as the distinction between the concepts of "data" and "information". The last two chapters deal with some key questions that must be resolved before any policy issues are addressed; their main purpose is to identify and formulate these questions, rather than to provide answers. The latter will have to come from panels of experts.

I should point out that this article represents my personal opinions and thus should not be construed as an official statement of the Arctic Research Commission.

## 1. THE ROLE OF INFORMATION SYSTEMS IN HUMAN SOCIETY

Since the end of World War II, human society has undergone a profound transition from an "industrial society" to an "information society", in which industrial, economic and military power is conditioned to information-processing power, and societal well-being, social organization, and government are conditioned to the information transfer capacity among elements of the population (Bell, 1973). Today, elements of the information society pervade even the economically least developed countries. In the early 1800's, a more gradual transition occurred when the industrial society emerged from a predominantly agrarian society.

It is important to realize that these transitions were driven almost exclusively by science when the results of scientific research were applied to technological development: it was science that made the transition into the industrial society possible, and it is science that is making the information society possible.

For the purpose of this article it is useful to review a few key facts concerning the development of science and the scientific method. Science emerged when it became apparent that the images of the world and environmental events, acquired through the senses and registered by the human brain in natural day-to-day experience, contained inaccuracies and subjective biases that interfered with the development of an increasingly complex society. It became apparent that in order to establish a repertoire of reliable information on cause-and-effect relationships, environmental exploration and documentation would have to be expanded from subjectively "relevant" phenomena to others that bore no direct relation to, or had no effect on, the

human organism. It was also realized that a merely passive, qualitative, random observation of environmental events did not yield sufficient information. Active, quantitative probing and systematically planned experimentation became a necessity: the empirical method was born. Our sensory systems needed extension to achieve higher resolution and accuracy in the acquisition of environmental information, and scientific instruments were developed to make the measurements required for a quantitative description of processes occurring in a wide range of spatial and temporal domains, way beyond those of everyday experience.

A most crucial fact in this development was the realization that the organized documentation of facts in books, reports, and data repositories was absolutely essential for the recording and preservation of scientific results, their statistical interpretation and, in general, for the development of an "objective truth" about environmental events.

The importance of this seemingly trivial statement, and the fact that its significance reaches far beyond the realm of pure science, can be dramatized with the following observation. Human brains today are believed to be no different, anatomically, from the brains of humans who lived, say, five or even ten thousand years ago (no genetically significant change could have taken place in such a "short" time-span). What is it, then, that allows us today to do all these incredible things which our distant ancestors were unable to do, such as integrating differential equations, building airplanes or balancing our checkbook? It is the retrievable information that humans have stored physically in the surrounding environment--information that does not deteriorate and become subjectively distorted as what is stored in human memory and passed on orally to others (Roederer, 1979). In other words, what has changed over these millenia is not the structure of our brains, but the information and data systems built outside our bodies! In the light of the above, it is no exaggeration to state that librarians are not only the guardians of human civilization, they are the guardians of human intelligence!

## 2. DATA VS. INFORMATION

It is instructive to describe the need for data and information systems in the context of the evolution of research and development (R&D). A report by Arthur D. Little, Inc. (1978) identifies three "Eras" of R&D, leading to the transition into the information society. Each Era persists into the next; all three coexist today.

In the "discipline-oriented" Era I, starting some time before the turn of the century, basic research and discipline-centered R&D are the main sources of new knowledge. This is the era of the great discoveries in science and the inventions in technology--the theory of relativity, molecular biology, the construction of the automobile and the airplane, for example.

The "mission-oriented" Era II, starting during the 1950's, has as its basic ethic that of "organizing to do a job". It involves the great R&D enterprises and projects such as space exploration, particle accelerators, biotechnology and the nuclear industry.

The "problem-oriented" Era III has as its basic ethic the solution of society's problems. It is the era of the information society par excellence. The Arthur D. Little, Inc. report has identified ten problem categories as fundamental targets in Era III: environment; energy; economic well-being; safety; public health; transportation; crime prevention; and the administration of justice, housing and welfare. This list is most significant in the context of this review, because most of these items are directly related to the priority R&D needs identified by the U.S. Arctic Research Commission (1986).

Era I information systems mainly handle "end products" of research, such as articles in scientific journals, books, etc.; producers and users of data normally belong to the same research group. The principal output of Era I is scientific and technological knowledge. Era II involves data-intensive research efforts, but the main output, information, still remains within limited groups of the scientific and technological community. In contrast, the problem-oriented Era III information and data systems mainly handle cross-disciplinary data flow (often intensive raw data flow). Data producers and users usually belong to different groups and even to different disciplines, but they must be able to communicate with each other and work cooperatively in data analysis and interpretation. The data needed are often of synoptic type, acquired in large monitoring networks, observatories, national laboratories, or based on large-scale statistics or surveys that cannot be operated or conducted by isolated groups or institutes. Intensive data flow is the touchstone of Era III.

It is clear that as one advances from one Era to the next, government agencies are found to carry increasing responsibilities in the development and implementation of required R&D and related data and information systems.

A few definitions are in order (Roederer, 1981). We usually think of the concept of "data" as embodying sets of

numbers given in some digital or analog representation, encoding the values of some physical magnitude measured by a certain device under certain circumstances. We usually think of the concept of "information" as embodying statements that represent answers to preformulated questions or that describe the outcome of expected alternatives (in information theory, a precise mathematical definition of information is used). And we may give an operational definition of scientific "knowledge" as any comprehensive information about a given system that allows making predictions about the system's future or postdictions about its past.

Data are meaningless without the information on what physical magnitude they represent; on the instruments used in the measurement; on units and formats, etc.; and on the particular circumstances in which the data were taken. Information, in turn, is meaningless without knowledge of the questions or alternatives that it is supposed to answer. Knowledge is meaningless without specification of the system to which it pertains.

As simple-minded examples of each one of these concepts, data, information and knowledge, consider the following statements: "In this forest there are 3,422 pine trees" (data); "This particular tree is a pine tree" (information); "30.4% of all trees in this forest are pine trees" (knowledge). It is, however, important to note that data need not always be numbers (see further below), and that the system mentioned in our "definition" of knowledge need not be a physical entity. It also is important to note that, in a sense, everything is information: data is information answering to the question "how much?" or "how many?", and knowledge is information answering to the question "why?"

Indeed, what is one person's information may well be another person's data. In science, information itself is almost always expressible in quantitative form and can become data out of which information of a higher level can be extracted. One thus obtains the hierarchical chains of information-extraction processes common to practically all research endeavors. An example is the conversion of raw or "level I" data, such as the length of the column of mercury in a thermometer, to "level II" data, which usually represent the actual values of a physical magnitude as determined by some algorithm applied to level I data. A thermographic record or a Landsat image are examples of level II data. Similarly, "level III" data are obtained by processing level II data (mostly from multiple data suites) with the use of mathematical models so that information can be extracted on the global behavior of the system under observation. A weather map is a typical example of level III data.

Finally, we may add a category of "level 0" data, in which we include samples (such as ice cores, geological samples, and moon rocks) and other material objects (such as archaeological finds, scrolls, art objects); while these are not always expressible in numerical form, they do bear the characteristic features of "data".

Data can be transduced (i.e., converted from one form or medium into another), transmitted, compressed or integrated (for instance, time-averaged, or converted from multiple data suites into single-parameter values, respectively), stored and retrieved. In each process, there is a loss of information through the introduction of noise (for instance, in the transmission process) and the involuntary or deliberate destruction of data (such as happens in data compression or integration).

It is of fundamental importance to realize that in each of these data/information transformation processes the human factor intervenes in a most crucial--and unavoidable--way. Indeed, information-extraction from any kind of data engages the human brain at some stage. If not in the actual process of extraction --e.g., visual pattern recognition while examining a Landsat image or a thermographic record--the brain is engaged in the formulation of the questions or alternatives, to which the information to be extracted refers, or in the design of the apparatuses, algorithms or programs used in data and information handling. It is in this particular area, the human-machine interface, where the development and application of new technology has the greatest potential of success in the near future.

### 3. ISSUES CONCERNING AN ARCTIC DATA AND INFORMATION SYSTEM

Data and information are closely knit concepts and should not be separated artificially in a discussion of management policies, even if the persons handling data systems and information systems usually come from different professional communities. In this chapter we shall discuss some major issues that must be addressed and resolved before a data and information policy for Arctic research can be formulated. While our focus is on arctic needs, much of what is stated below applies to all information and data systems.

#### 3.1 Interlinking Data

An important part of arctic data belongs to the world data base. Not always are these data specifically identified or "flagged" as pertaining to the Arctic. There is a need to design strategies for easy and speedy retrieval of the arctic component of data currently existing in national repositories, and for earmarking data to be deposited there in the future.

On the other hand, many data of arctic interest have to do with other geographic regions, such as data on migratory animals or on global climate. It is necessary to define explicitly what is meant by "being of arctic interest", and it is necessary to remain flexible in such a definition.

A central arctic environmental data directory does not exist, nor is there any single organization that could refer a scientist or engineer speedily to the appropriate data repositories (with the exception of some limited data sets in a few "traditional" disciplines.) Furthermore, as more and more "Era III" (Chapter 2) data are needed, and as scientific research becomes more and more interdisciplinary, the establishment of "interactive data centers" where scientists congregate to work with a common data base cooperatively and in computer-interactive form will become a necessity.

### 3.2 Interlinking Information

There is an increasing need in all Era III R&D ventures to find out in near real-time who is doing what, where, when and why (the "five W's"). This is particularly true for scientific and engineering research in the Arctic. We don't mean here catalogs of projects published in book form 1-2 years after the projects have started: we mean continuously updated and electronically accessible directories. In some branches of science this already exists; for instance, the Satellite Situation Center at NASA's Goddard Space Flight Center. What is needed is an "Arctic R&D Situation Center", operating on the basis of an electronic communications network linking it with the principal foci of arctic R&D activity in government, academe and industry.

Electronic mail networking between individual scientists, data centers, libraries, major research institutions, state and federal agencies, groups in other arctic countries, and world data centers should be expanded far beyond the present state. Centralizing the operation for arctic information through the establishment of consortia, single access points and intermediate nodes will be necessary to achieve the desired efficiency and accessibility.

Of significant promise is the recent progress in facsimile transmission systems. While they will not displace electronic mail, they have capabilities such as the transmission of pictures, graphs, tables and hand-written information, that an electronic mail system does not have. The social sciences will benefit particularly from facsimile systems, which have the added advantage of not requiring any training for their use. Portable "fax" machines will greatly expand their use.

### 3.3 The Human Factor

A directory is only as good as the persons collecting and sorting the information. A literature search is only as good as the list of keywords chosen by the person doing the search. Random errors and deliberate or involuntary destruction of information occur whenever data or information is transformed, transferred or transcribed; even if much of this can now be done by machines, such machines must be programmed by humans.

It is important to exploit the capabilities offered by modern technology to maximize automation and minimize the need for human intervention in information and data systems. For instance, the development of new parallel processing and content-addressable memory systems with context-dependent information retrieval may lead to the real possibility of "intelligent searches", which are less dependent on key-wording. Quite generally, new technology offers its greatest promise in the area of "warm body/cold machine" interface at the input and output levels. An example of this are computer visualization techniques for the graphic display of level III data. Such techniques combine the best of two worlds: computer power with the power of the human visual apparatus, which still is the best (though not always the fastest) pattern-recognition system available.

### 3.4 Standardization

One of the greatest difficulties in the organization of data systems, especially in the environmental sciences, is the question of standardization of data. By this we mean not only the standardization of data formats, but also the standardization of the measurement instruments themselves. Reproducibility and intercomparability of data constitute the very basis of the scientific method, and this requires uniform, standardized measurement processes. On the other hand, the continuity of the measurement process per se is essential to the acquisition of a long-term data base for the study of environmental change. Protocols for standardization of environmental and biomedical data of the arctic regions are badly needed.

Some aspects of information systems also need standardization. For instance, programs and pertinent user instructions for electronic communication systems, particularly the log-in and retrieval procedures, differ greatly among available systems, and switching from one to another can be a nightmare even for the most experienced scientist or engineer.

### 3.5 The Gray Literature

The exponential proliferation of the "gray literature"--unreviewed preprints and reports with limited, usually author-controlled distribution--is presenting increasing difficulties to librarians and scientists alike. Rather than focusing on curative medicine, one should practice preventive medicine to help arrest this trend. This will require doing something about the main causes for this proliferation. They are: 1. The speed of progress in many scientific disciplines is so fast that scientists cannot afford to wait until their articles are published to promulgate their results. 2. Scientists are increasingly disenchanted with the peer review processes of many reputable journals, which in their opinion diminish their chances of publishing unusual results or bold, innovative ideas. 3. There is a notable lack of incentive for the scientists of some governmental agencies to publish their results in the scientific literature. 4. The often long delays in the public release of proprietary information discourages publication of results that may be many years old.

### 3.6 Environmental Monitoring and Long-Term Data

Scientific research is based on the measurement of observable quantities and the establishment of functional relationships between those that are linked through interactive processes. There are three basic types of measurements. First, there is the class of "pioneering" measurements that may lead to the discovery of previously unknown or unsuspected relationships or phenomena. Second, there are the measurements made to verify, confirm, reproduce or statistically consolidate a newly found relationship or behavior. Third, there is the class of systematic, continuous, carefully calibrated, absolute measurements necessary to obtain a comprehensive understanding of long-term trends of a given natural system.

Scientists involved in the study of natural phenomena often prefer to deal only with the first and second classes of measurements, because these may lead more readily to publishable results and topics for dissertations, leaving the less glamorous long-term measurements to the operational agencies. However, such long-term measurements, especially the monitoring of environmental parameters, are extremely important in providing insights into the global behavior of a system. Relevant examples are the study of climate change in the Arctic and the study of health trends in the indigenous population. A close collaboration between scientists in research institutions and operational agencies is essential to develop and maintain a scientifically sound program of environmental and biomedical monitoring in the Arctic.

### 3.7 Recording and Conversion of Proxy Data

A wealth of information on the Arctic still remains stored in human brains and has not yet been recorded in indelible memory systems. The persons carrying this information are disappearing fast. An all-out, organized effort is needed to record the oral history of the Arctic, not just for sake of social studies, but also to extract indirect scientific information about recent climate change, trends of air turbidity and ecosystem dynamics, human health, etc.

## 4. POLICY CONSIDERATIONS

A national policy for an Arctic Data and Information System and its management should accomplish three objectives. 1. It should set general guidelines for the development and the operation of an Arctic Data and Information System serving all interested parties; 2. It should establish procedures or methods for the management of data and information obtained by federal agencies or by any organization supported with federal funds; 3. It should promote activities in the private sector and the State of Alaska that will contribute to a better dissemination of arctic data and information .

There are a number of policy issues that must be resolved. Some are discussed below, again, in no particular order of priority.

### 4.1 User-Driven Data and Information System

Any formally established system should be driven, and to a certain degree controlled, by the community of users. Data and information organizations have a tendency of developing a bureaucracy of their own unless an oversight body is established. On the other hand, however, a good measure of initiative must be left to the technical staff of a data and information system so they can expand their user market with innovative ideas about improvements of their service, particularly, the incorporation of new technologies.

A mechanism involving the community of users is also needed to make consensus decisions about what data or information is to be stored in a repository; what activities are to be listed in a "W-5" directory (Section 3.2); how certain data should be standardized; which sources of data or information are considered unreliable, etc.

## 4.2 Quality Control

One of the most difficult issues in data and information management is quality control. There is "good" and there is "bad" data and information. In some cases, quality can be expressed in terms of the statistical significance of the data. But often this is not possible, either because of the incompleteness of the observations, the lack of some needed complementary information, some politically motivated bias in reporting, or, simply, because of a lack of adequate scientific training of the originator(s) of the data. While in general quality control is the responsibility of the scientist generating the data or information, the agency funding the research shares in this responsibility. Mechanisms to ensure the most rigorous adherence to scientific principles in data acquisition should be set up; this is especially critical for environmental information and data on the Arctic.

## 4.3 Proprietary Information and Confidentiality

A significant part of arctic data and information generated by the industrial, defense and biomedical establishments is proprietary, classified or confidential, to protect competitiveness, national security and the anonymity of patients, respectively. It is important to establish a dialogue among these three establishments as part of a national arctic data and information policy in order to promote a faster release of information after it has been declassified. More generally, it is necessary to develop an efficient mechanism with appropriate incentives to improve the sharing and dissemination of data and information among public and private institutions.

Another issue that must be addressed is the proprietary rights of an originator of scientific information supported by federal funds. On the other side of the coin, however, it is essential to give due consideration to the often forgotten right of the local residents of the Arctic to receive information emerging from research done by others amidst their own social or physical environment: appropriate standards of ethic should be developed for all federally supported research work in the Arctic regions.

## 4.4 Protection of Public Data and Information

Some data are invaluable because of the uniqueness of the event that they describe. Other data have been obtained at a great cost to their originator--often the federal government. All data need adequate protection from natural hazards, vandalism, terrorist action, computer "viruses" and accidental erasure. This could be a costly endeavor, but it must be taken

into consideration in the formulation of arctic data and information policy.

#### 4.5 The Cost of Data and Information

It is virtually impossible to establish the monetary value of a given set of scientific data or a given type of information, to the point that it would be highly unrealistic to attempt setting up a "self-supporting" Arctic Data and Information System. The most one could achieve is an operation in which the nominal cost of each information or data request is recovered (processing of the request, materials used and mailing).

#### 4.6 The Role of the Federal Government

This brings us to the "ultimate" question in the development of an Arctic Data and Information System: the role of the federal government in the formulation and implementation of a coherent data and information management policy. This role emerges quite clearly if one accepts the thesis, which this author supports, that the establishment and operation of a national Arctic Data and Information System can only be successful if it is set up as a taxpayer-supported service to society, like the administration of justice and most other problem categories of Era III (Chapter 2).

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## **U.S. Arctic Information and Data Activities and the Global Connection**

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The Northern Libraries Colloquy has provided, since its first meeting in 1971 at the Boreal Institute, an international forum for the exchange of information and ideas among the northern bibliographic community. These biennial meetings have served as an important link among northern libraries, bibliographic services, and other institutions that are involved in the organization and dissemination of information related to the circumpolar North. The fact that 80 or more participants from some eleven nations are attending this meeting in Boulder reinforces the continued importance these activities have for national and international planning and implementation.

The theme, Northern Information--The Global Connection, truly encompasses all regions of interest, Arctic and subarctic, and other cold regions including the alpine, the Antarctic and subantarctic. The global connection theme is designed to focus on networking of northern information. New technologies including CD-ROM and satellite communications, to name only two, are revolutionizing the means of delivering information to the user. However, the comprehensive acquisition of that information from the many diverse sources throughout the circumpolar nations and other interested participants still remains a challenge. In order to improve dissemination of research results, it is in our collective best interests to strengthen institutional activities that already are engaged in the processing of literature and to further develop mechanisms for uniform acquisition and dissemination. How to further bring together or integrate the bibliographic and communication activities is a topic to be more thoroughly explored. Recommendations as to what next steps are required for furthering cooperation in international northern information are a desired outcome of this Colloquy. Networking serves a logical step that has already begun to occur, but requires increasing commitment by all of us. The development of an international polar network may be a logical next step of this Colloquy. Recommendations to this effect will be carefully examined and considered within the United States, as may be the case in other countries.

The United States has several reasons for its interest in the activities of the Colloquy. As reported at the 1986 Colloquy, the U.S. Congress enacted the Arctic Research and Policy Act of 1984 (Thuronyi and Brown, 1986). The Act provided for both the Interagency Arctic Research Policy Committee and the Arctic Research Commission. The Interagency Committee is to promote Federal interagency coordination of all arctic research activities including the

sharing of data and information associated with Arctic research (Section 108 (a)(9)(B)). The Act assigns to the Arctic Research Commission the responsibility to suggest methods for improving efficient sharing and dissemination of data and information on the Arctic among interested public and private institutions (Section 104 (a)(6)). The United States Arctic Research Plan was prepared and submitted to the President in July 1987, who in turn submitted it to Congress (Interagency, 1987). The need for a comprehensive approach to both information and data were discussed in the Plan, but no conclusions were reached on how to accommodate the many needs. As part of Interagency planning, a study was conducted by the Arctic Environmental Information and Data Center (AEIDC) to explore the design of a National Arctic Information Network (Hickok, et al., 1987). Recommendations focus on management options and several data and bibliographic needs: (1) global data, (2) social and health, and (3) natural resources. A related activity undertaken by state and Federal agencies in Alaska through the Committee on Natural Resource Information Management was to convene the Northern Information Networking Conference in Anchorage in November, 1985 (Cote, 1986).

A second U.S. Interagency activity has involved data management with particular emphasis on long-term arctic data sets that have global and regional significance. A workshop was held in Boulder in March, 1988. As a result of that workshop, a group of government participants and others from North America is being organized and will prepare a data directory as an initial task. This should complement many of the activities of the Colloquy. Close working relations should be maintained between bibliographic and data groups, particularly in sharing available technologies for data and information handling and the standards governing system development.

Several other U.S. activities warrant mention. In late 1987, the National Science Foundation on behalf of the Interagency Committee published the inaugural issue of its new journal Arctic Research of the United States (NSF, 1978- ). The intent of this new journal, modelled in part after the Arctic Bulletin of the 1970s, is to inform a broad audience of individuals and organizations of U.S. government-supported arctic programs. The first issue emphasized 1986 activities of the Federal agencies. The second issue covers major non-federal-supported research in Alaska, international activities, and reports on the National Snow and Ice Data Center and the Cold Regions Bibliography Project.

Finally, within the United States, a group of universities recently organized themselves into an Arctic Research Consortium of the United States (ARCUS). The primary mission of ARCUS is to strengthen and advance arctic research to meet national needs. In addition to U.S. institutional membership, international and associate members will be eligible to join the Consortium. Some functions of ARCUS will be to maintain awareness of needs and problems involving information and data exchange on arctic matters and to provide linkages with antarctic research efforts and with international arctic research centers. Thus, the Consortium may become a vehicle through which many of the academic information activities can be coordinated within the United States and with international counterparts. The first formal meeting of the Consortium is planned for Fairbanks in October, 1988 as part of the annual meeting of the American Association for the Advancement of Science Arctic Science Conference.

International activities in the Arctic are increasing. Following several years of informal discussions about international scientific cooperation in the Arctic, a meeting was held in Stockholm, in March, 1988, to discuss the need for an international Arctic Science Committee. Twenty-nine participants from the eight Arctic countries (the five Nordic countries, Canada, U.S., and USSR) agreed that a non-governmental organization should be formed to promote international arctic scientific activities. It is proposed that permanent and *ad hoc* working groups be established under a Scientific Council. One such working group may encompass information and data needs. The Northern Libraries Colloquy was identified as a potential activity which might become involved.

In conclusion, I raise the question, is the Colloquy at a crossroads or turning point in its evolution? Over the past two decades the Colloquy has provided the international linkage among northern libraries and others interested in information. This has been accomplished on a largely informal basis and quite successfully with much credit due to a very small group who have pioneered the vision of international communication, documentation and exchange of information. The dramatic increase of interest in the North, renewed interest in social and health sciences, the explosion in quantity of information, new technologies, and increased interests in international collaboration suggest that the time may be appropriate to become more formally organized. A more formalized group would insure continuity in planning and implementing specific activities, particularly between biennial meetings, and might more efficiently demonstrate how resources are being shared towards common goals. An international polar bibliography and network could be one such common goal. Other goals might be the preparation and updates of lists (or directories) of information on the North including data holdings, journals, and formal newsletters dealing with polar research. A more formal international organization could also help each member country standardize the organization and networking of its own diverse holdings and activities. In conclusion, two questions require attention. What steps should be taken to organize access to international Northern and polar information and how might each interested country participate in such important endeavors?

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# Design for a U.S. National Arctic Information Network

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## Introduction

Two years ago at the Eleventh Northern Libraries Colloquy in Sweden, I reported on a project for the National Science Foundation to develop a design for an Arctic Information Network for the United States. The project has been completed and the final report distributed (Hickok, Sokolov, and Dursi, 1987). This paper, summary review of the project and the proposed design, will follow a simple outline: the objectives and scope of the information network; our methodology and findings in developing the design; and a description of the proposed design; in addition, a short listing of some current networking efforts; and finally, some of the specific steps we suggested for the networking that are of direct relevance to arctic libraries. Hopefully, these suggestions will be the starting point for further discussions during the coming week.

## Objectives and Scope

The objective of a national arctic information network is to make it possible for a user to ascertain if information on a particular aspect of the Arctic exists, and if so, how to obtain it. In our design we examined all aspects of arctic knowledge; from individual and corporate expertise to ongoing research and data to the printed word. We were instructed to concentrate on the printed word, and our design and implementation steps reflect that focus.

We also hoped that our work in developing the design plan would identify specific areas for cooperative efforts. In the report, we have tried to identify steps towards networking that can be taken with or without a formally adopted national plan.

Our scope was national. That is, the United States. We were to be aware of the international implications and to give particular consideration to Canada. (We interpreted this to mean that we could not make any commitments for the Canadians, but we could solicit their advice--which we did.)

## Methodology and Findings

The methodology was really quite simple. We talked to everyone we could with an expertise in arctic information. I personally criss-crossed the country, visiting most of the arctic libraries listed in the second edition of the Polar and Cold Regions Library Resources (a directory produced for the Colloquy by the Boreal Institute). In addition, David Hickok, the director of AEIDC has had continuing consultations with Fred Roots, the chairman of the Canadian Arctic Research Study Group. Finally, we wrote a draft report that was circulated to many of you here. We received many comments, suggestions, and criticisms, and we rewrote much of the draft in response to these reviewers comments.

Our findings ranged from the obvious and expected, to some surprises. They are briefly summarized below.

Data: We found, not surprisingly, that the problems of organizing data was being addressed in some disciplines, not in others. For example, snow and ice data management is being implemented, biological data is not. There are few standards for data and those that do exist deal with the actual handling of data. A means to evaluate the quality and reliability of data is lacking, and it is desperately needed. Data that are provided on-line for the casual user need to be specially prepared, and the data base protected. And finally, the organization and management of data must be on a discipline level, since each discipline uses data differently.

Experts: We were surprised to find how important direct access to experts is to users. The only cross-discipline, cross-organizational directories that served to identify arctic experts, are the Canadian Department of Indian and Northern Affairs series (now on-line on ASTIS) and our own Current Research Profile series. Neither series has been updated for several years and both have apparently been discontinued because of funding problems.

Arctic Libraries: As already mentioned, we focused on the printed word and the repositories of this form of information--arctic libraries. Our findings probably hold no surprises to anyone in this audience. With the exception of the Alaska and Polar Regions Collection of the University of Alaska's Rasmuson Library, most of the U.S. arctic libraries were highly specialized. Some of the arctic libraries are members of bibliographic utilities. Most aren't.

Because the more directly relevant arctic materials tend to receive special treatment in the smaller libraries, the "good" stuff is often organized via a specially devised in-house system. These materials are usually not shelved by the Library of Congress or Dewey classification system. For example, CRREL has its non-arctic engineering materials shelved by the familiar Dewey scheme, but the materials listed in the COLD data base are shelved separately by the database number. (In the case of the CRREL collection, access to this material is available via the COLD data base.) INSTAAR has a fine collection of glacial and arctic vegetation theses, and

an extensive report series, both of which are shelved separately, and listed only on an in-house data base. World Data Center-A for Glaciology has a collection that is listed on an in-house data base. (WDC-A is investigating the possibility of adding this file to the COLD data base, and I heartily endorse this idea.)

Our original intention to evaluate the U.S. arctic libraries using the conspectus method proved impossible. This method, developed by the Research Libraries Group, requires that the collection be organized by the Library of Congress scheme. As described above, the unique holdings (and most important arctic materials) of the libraries visited tended to be in specially organized collections.

Bibliographic Data Bases: The arctic content of various subject oriented bibliographic data bases was evaluated by Rita Dursi. (Her report detailing this evaluation is included in Volume 2, the Appendix, of our final report.) After carefully reading the descriptions and checking the journals covered, we decided that the published journal literature appeared to be covered. (How well it was covered was beyond our resources to evaluate.) We decided the best we could do was to get some indication of the gross number of arctic relevant items included and to see how the arctic materials were indexed within each data base. We had intended to do more evaluation of our findings, looking at the quality or relevance of the arctic coverage. Reorganization of the University of Alaska and drastic budget crunches curtailed our activities. I am happy to see that there are several papers scheduled for delivery during the next few days that involve this type of evaluation.

Gray Literature: Gray literature was perceived by many Alaskans, both librarians and researchers, as a serious problem in the field of arctic information. We were surprised to find that many outside of Alaska didn't consider it an important issue. A part of the project was devoted to evaluating the seriousness of the problem by analyzing the coverage of the gray literature by the bibliographic data bases. I will be delivering a paper later in the week on the details of this study and will just summarize some of the findings here.

For the purposes of this paper, we will define gray literature as technical reports that are not distributed through the usual channels. With the help of several Alaskan special librarians, we identified over a hundred titles of technical reports for possible use in our analysis. These were titles from the shelves of their libraries, that the librarian judged to be important in their field and suspected might not be listed on bibliographic data bases. Only titles in appropriate subject areas were searched in each data base. Some data bases were searched for significantly more titles because they were multidisciplinary. For example, NTIS was searched for each of the 72 titles, because it is cross-disciplinary.

We looked for the specific titles (by keywords in the title) and examined any hits to be sure that the report title sought was the one recovered. In terms of successful searches, COLD did very well with 58 percent of the 24

titles looked for, GEOREF had a 35 percent hit rate, and NTIS had 25 percent. However, since over half of the titles used had federal funding or authorship, NTIS, the data base for federal technical reports, should have had at least a 50 percent ratio. (I might add that some of the well respected data bases, that claim to cover "technical reports," failed completely. Most disturbing to me was the failure of BIOSIS to produce a single hit in searches for 42 relevant technical report titles.)

Analysis of the success rates by subject fields is revealing. COLD and GEOREF actively seek the technical report materials, so the coverage of their disciplines: permafrost and snow/ice is best. NTIS waits for the reports to come in the door, as do the major subject data bases. From our evaluation, we conclude that technical report or gray literature coverage of arctic subjects in the fields of energy, marine ecology, oceanography, water resources and terrestrial ecology are very weak.

The librarian of the Alaska Resources Library, Martha Shepard, estimated that her library receives 100 to 150 titles per month that she considers gray literature. If the items fit into the library's collection policy (Alaska resources and their management) they are cataloged and entered onto OCLC. Otherwise they are passed on to other libraries or simply discarded. Ms. Shepard also estimated that there are 10,000 to 20,000 items of gray literature "out there." Other experienced Alaska special librarians that I questioned on the matter think her estimate is conservative.

On the other hand, after my visits to the U.S. arctic special libraries, I believe that much of the significant arctic gray literature is already in our libraries. It's in those special collections, that are carefully indexed on an in-house data base. The problem is that the rest of the world doesn't have access to them.

Private Sector Information: The problem for the information and data collected or produced by the private sector, is simply, to get the material released. If it is published in journals, it will be picked up by the bibliographic data bases. More frequently, it is released as a technical report and becomes just another example of arctic gray literature, to be included in any solution we develop for that problem.

Users: The users main interests were (1) a single focus for arctic information and (2) access to experts. They want one place where they can find out everything about the Arctic. Further, they would much prefer to ask an expert, who will listen to their problem and then direct them to the best single source of information for their specific answer--or better yet, simply tell them the answer. Unless users are doing a comprehensive review of the field, they usually want a single book or report that summarizes everything relevant to their problem. The presumption seems to be that the arctic expert can direct them to that single best title.

## Proposed Design

There are three elements in our design for an arctic information network: (1) member bodies formed around broad disciplines or interests; (2) technical committees made up of experts from the various member bodies; and (3) a means to coordinate the activities of member bodies and support the work of the technical committees.

Member Bodies: The member bodies would include any group or individual interested in the sharing of arctic information. The three bodies suggested would be for those with interests in: (1) the international or global Arctic, (2) arctic health and social sciences, and (3) the Alaskan (or U.S.) Arctic. Clearly there is room for other bodies, for example a Canadian or European Arctic group.

Our original idea in the draft report suggested a single member body based on the existing Council on Northern Resources Information Management (CONRIM). CONRIM is a cooperative organization of federal, state and local agencies involved in networking data and information in Alaska. The problem with our suggestion was geographic. There was a basic disagreement as to just where the center of the U.S. Arctic is located. We thought it was Alaska and the federal government thought it was in Washington, DC. Our original design focused on the Alaskan Arctic, and we missed the broader international and global interests of the nation. Further, health and social sciences have entirely different information and data needs, and interests and responsibilities that are both local and international.

We do continue to suggest that the almost ten years of experience in cooperative efforts by CONRIM be applied where appropriate. CONRIM has developed a generic memorandum of understanding for the sharing of information that provides a basis for joint projects and the transfer of funds. And it does this without committing the agency to any specific action. Because the agreement doesn't commit the member agency to CONRIM activities, each CONRIM project involves only those members with some clear interest or benefit in being involved.

Of the proposed member bodies, CONRIM has existed for almost ten years. A group is forming around the international and global interests represented at the Arctic Environmental Data Workshop that took place here in Boulder last March. The health and social science people seem to be getting organized as well.

Technical Committees: Most of the actual networking effort will probably be focused through technical committees composed of experts from one or more of the member bodies. These committees should be established as needed. We suggested committees are needed to address the problems of library information, natural resource data, health and social sciences data, data standards and coordination, and information liaison and referral.

Management Support: Because the U.S. Arctic is somewhat unique in that it is entirely within the jurisdictional boundary of a single state, most of

the activities involve either the state or the federal government. We suggest that the state and the federal government each set up an authority to speak on arctic information matters, and that they each appoint program officers who will work together in the coordination of the activities of the member bodies, and the support of the technical committees. We have called this federal/state support program a "secretariat".

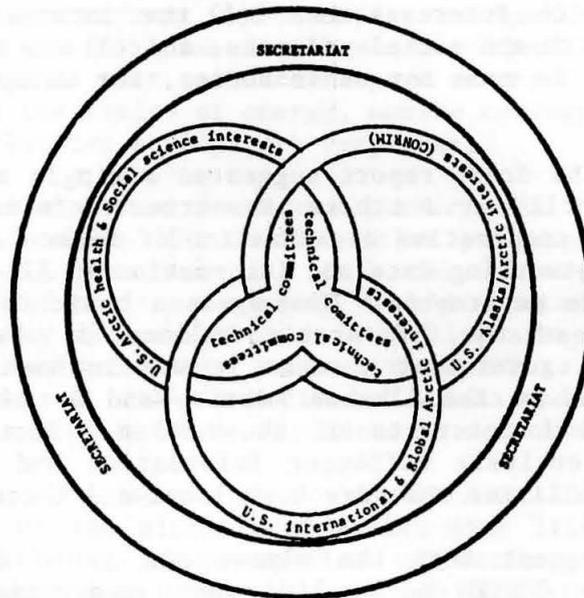


Figure 1. Network governance.

Figure 1 gives a sort of conceptual view of the proposed design. The overlapping of the interests of the member bodies, and the formation of technical committees from the pool of experts in the combined member bodies is clear. The unifying support and coordination activities of the secretariat or federal/state program officers serve to hold the several member bodies together.

We included this implementation schedule in the report (Figure 2). I might add that although the plan has not been officially adopted, the problems of managing arctic data were addressed at a meeting on arctic environmental data. The first step suggested is the development of data directories. Further, as reported above, the international and global arctic interest group seems to be coalescing around the problems of arctic environmental data, and the arctic health and social science interest group is also getting organized.

		PRELIMINARY TASKS	FIRST YEAR TASKS	SUBSEQUENT YEARS' TASKS
ORGANIZATIONAL MILESTONES		Identify federal & state arctic info. policy authorities >	Appoint program officers > Establish secretariat >	Establish bodies and technical committees
INFORMATION	DECISION TO DEVELOP A NETWORK	Plan national arctic bibliographic database	Develop National Arctic Bibliographic Database Implement gray literature capture mechanism	Maintain improved intellectual access to arctic information
		Develop gray literature capture mechanism		
KNOWLEDGE		Produce union list of serials in arctic libraries	Maintain union list of serials Develop access to bibliographic utilities Develop access to arctic special libraries	Maintain improved physical access to arctic collections
		Produce a directory to arctic research	Maintain directory to arctic research Produce directory to arctic expertise	Maintain access to arctic research and expertise
DATA			Develop discipline data directories Plan cross-discipline data directory Plan discipline data centers	Develop and maintain access to arctic data and data centers

ESTABLISH AND MAINTAIN CENTRAL REFERRAL  
MODE FOR ARCTIC INFORMATION, KNOWLEDGE, AND DATA

Figure 2. Network implementation chart.

## Current Networking Efforts

There have been ongoing or new efforts for arctic information and data networking since the report was published. First, in the Alaska Arctic, CONRIM has had a slow year, largely because of massive cuts in state agencies, that seemed to focus on the laying off the individuals active in information and data management (and hence in CONRIM). However, CONRIM has survived and I expect it to be active in the realm of Alaska data and information. As mentioned above, there was a workshop on management of arctic environmental data in Boulder last March. It was attended by about 50 individuals, from the United States and Canadian federal agencies, a number of universities, several contractors and a couple of Alaska Arctic residents. And on the international scene, we have this meeting, the Northern Libraries Colloquy. I hope something productive comes from our efforts here.

It is unclear where the plan will go from here. However, official adoption by the U.S. federal or Alaska state government does not seem as important as the implementation of some or all of the suggested steps by those of us assembled here. The work on this project has led me to understand that the success of an arctic information network will be based largely on voluntary cooperation by many for mutual benefits, rather than upon a single big supporter (or funding source). We probably all will need some financial help to implement a network, but we all have enough to gain in cooperation that we should be willing to make some contributions on our own.

For those of you who might be interested in reading the entire report, it has been distributed to arctic libraries in North America. In addition copies are available from AEIDC, for the approximate cost of reproduction. (On microfiche at \$4.50 a volume, or in paper copy at \$10.00 for Vol. 1, \$15.00 for Vol. 2, and \$20.00 for both volumes. The Executive Summary in paper copy is available at no charge.)

That concludes my formal report. However, I would like to list the specific implementation steps we recommended relevant to this group; I offer these as a basis for discussion in the hopes that we will come up with an agreement to tackle one or more of them. There are two categories: Physical access and intellectual access.

### 1. Physical Access

Improving the physical access to arctic information--the tools that help us to actually obtain the reports.

Union List of Serials: The easiest of all would be to produce a union list of serials. I was amazed to find the variety of international publications at the various libraries I visited, and locating some of them is a real problem. These aren't on the bibliographic utilities.

Access to Special Holdings: The special collections in each of our libraries are a wealth we should be sharing. On the other hand many of us

have spent a great deal of time and effort to collect them for our immediate patrons and we aren't set up for major lending programs. Where do we draw the line?

Access to Bibliographic Utilities: And most of us are not on, nor do we have access to, the major bibliographic utilities. If we had a network, couldn't we all get search only access to the big data bases?

## 2. Intellectual Access

Improving the means to identify the titles that contain the information we need.

National Arctic Bibliographic Data Base: To improve the intellectual access to arctic information, we suggested a national arctic bibliographic data base, which would provide access to those arctic subjects not adequately covered in the existing discipline data bases. LC had offered its services in the early hearings on arctic research, and COLD is the only viable U.S. arctic bibliographic database candidate with a track record. If its coverage were expanded into arctic subject areas not otherwise available, it would be a great service to us all. We suggest input from various sources. And the need for funding--a long term commitment to funding.

Gray Literature Capture: We also proposed an active mechanism to capture the arctic relevant technical reports--the gray literature. The access to these materials should be via the above mentioned national arctic data base, and a repository system should be established for them. The distribution of them would be through ILL, microfiche, or perhaps CD-ROM.

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# A Conceptual Framework for a Canadian Polar Information System

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## Abstract

A framework is proposed for a comprehensive Canadian polar information system (CPIS), which takes into account Canada's unique national needs and the mutual interdependence of Arctic nations on one another for information. The paper urges that any plans for a Canadian polar information system be compatible with other such major systems in planning or operational stages elsewhere. Also, that it be designed with the latest developments such as Open Systems Interconnection (OSI) and CD-ROM technologies in mind.

## Introduction

One of the major recommendations of the report Canada and Polar Science (released May 1987) was for the establishment of a Canadian polar information system.

The report recommended: "the establishment, in co-operation with the National Libraries and with provision for continuity, of a Canadian polar information system, a comprehensive, coherent, multi-disciplinary information and data system of national and international polar knowledge. The system should incorporate or build upon existing data and information systems, use modern data and bibliographic technologies, be compatible with national and international data systems and be accessible to the Canadian polar research community and northern institutions."

Today, I shall try and present a conceptual framework for such a system which takes into account Canada's unique national needs and the mutual interdependence of polar nations on one another for information. It is urged that a Canadian polar information system be compatible with other such systems elsewhere. Also, that it be designed with the latest technological developments in mind.

My presentation is divided into five parts: CPIS - organizations, CPIS - foundation, CPIS - scope, CPIS - access, and CPIS - technological considerations.

Please note that all acronyms and abbreviations used in this paper are explained in Appendix 2.

The objective of the paper is not to specify an ideal system. Instead, it contains ideas, which may be considered before a design is finalized. The evaluation of each idea should be based on its own merits in a particular context.

### CPIS - Organization

It is suggested that a CPIS committee be established under the aegis of the Canadian polar research commission, or a similar federal government body.

The Committee membership would comprise NLC, CISTI, INAC, ACUNS, AINA, BOREAL, C-FER, C-CORE, and other major players on the Canadian polar research and information scene.

The Committee, as its first task, would analyze the expressed and anticipated information needs of the polar research community. A document containing these needs would be widely circulated for fine-tuning and further input to the potential users of the CPIS.

A few suggested terms of reference for the Committee are:

- determination of specifications;
- system selection;
- leadership role in database design;
- coordination role in development of standards;
- determination of content, access and outputs;
- assurance of continuity, e.g. funding mechanism;
- assurance of quality;
- establishment of liaison and information role.

### CPIS - Foundation

It is suggested that the CPIS Committee:

- Consult with organizations which already have databases or expertise in information systems, viz. AINA, BOREAL and CISTI.
- Rely on documentary resources of major libraries such as INAC, AINA, BOREAL, CISTI, NLC, Beaufort Sea collection at Yukon Archives, James Bay collection at L'Université du Québec, Dene Nation Library/Archives, and others.
- Divide responsibility among several institutions for timely indexing and abstracting of documents. This arrangement would also obviate the need for exorbitant core funding for documents in one institution.
- Take into consideration the positive features from non-Canadian systems/databases, e.g. AORIS, ASFA, GRID.

- Aim for compatibility with other relevant systems as far as possible, both within and outside Canada.
- Preferably, consider locating the CPIS's administrative offices in the National Capital Region because of the proximity of several valuable northern collections.

#### CPIS - SCOPE

Phased inclusion of any or all of the following in a CPIS, in conjunction with an on-going consultative process, is suggested:

- Directory of polar information resources.
- Directories of research and researchers.
- Records for published documents, unpublished report literature as well as ephemeral documents.
- Research in progress including funding information.
- Numeric and other scientific raw data.
- Full text for selected categories of document.
- Access to the system in both official languages.
- Content to include documents in several agreed-upon languages, with records appearing in original or transliterated form as warranted.
- Availability information for resource sharing.
- Multidisciplinary information on Canadian North and circumpolar regions, including sociological aspects.

#### CPIS - ACCESS

One keyword which underlines this entire paper is "access". It would be almost futile to plan and implement a Canadian polar information system if it were not easily accessible to those who need information from it. Therefore, it is suggested that every effort be made for some or all of the following access modes, as deemed appropriate, or as dictated by the availability of resources:

- Availability of CPIS on CAN/OLE system throughout Canada, and abroad when possible.
- Direct on-line access to CPIS within and outside Canada if possible, for authorized end-user searchers, and intermediary searchers, i.e. librarians, and information brokers.

- Exchange or supply of computer tapes to designated participants for merger with other compatible systems, potentially resulting in a truly national or international polar information system.
- Document availability specially from designated document providers, e.g. on CAN/OLE.
- Document availability through selective full text downloading, telefacsimile, airmail, courier services, and local delivery services, such as the Canadian federal government libraries' delivery service in the National Capital Region.
- Limited access to certain categories of information in CPIS to authorized users only for security reasons.
- Mode(s) of access to be selected after appropriate investigation in particular context(s).

## CPIS - Technological Considerations

### Data Management

Consider modern concepts of systems design, viz:

- data modeling;
- normalization of data;
- data definitions;
- data dictionary;
- relational DBMS;
- distributed systems;
- telecommunications switching packages;

When planning a new system, even if it is intended to be used in only one organization, data management concepts should be considered.

When an application is centralized, communication of data and coordination of management information is generally not difficult because of a single machine environment. However, in distributed systems, open exchange of information between systems, between hardware manufactured by different companies and across different communications software can be achieved only through proper planning.

### Data Modeling

Data modeling is required virtually in designing any type of database. Modeling of processes and interaction between data and processes is needed. If designed correctly, this exercise is called normalizing of data. Once data are modeled in the normalized form, maintenance of data can be done independent of applications. Designing of a new application or modification of an existing database will not affect the data itself. Otherwise, endlessly serious problems may occur with data.

## Data Definitions

Data elements should be defined and named. Until data are defined and named, a data dictionary cannot be used.

## Data Dictionary

In "real" design, conceptual and actual data are merged. Data modeling and database maintenance are facilitated by having a data dictionary.

Each system, explicitly or implicitly, has a data dictionary. Data dictionary is an essential part of modern database management.

A data dictionary can either be embedded in a system, or definitions of metadata can be exchanged in documents located in different systems. Open systems architecture allows meaningful exchange of information through data dictionary.

## Open System Architecture

Open exchange of information across different hardware, software and communication lines can be achieved only if the principles of open systems architecture (OSA) are incorporated at the design stage.

Each system, designed according to OSA, shows the same face to users or other systems. Internal complexities of systems are transparent to the user. Translation is done from the internal language of hardware, software and communication packages into an external language which is comprehensible to all participating hosts. For example, in one system, numbers, alphabets and symbols may be represented in one way, yet in another system, the same symbols etc. may be represented quite differently. The translation provides mutually comprehensible language.

A data dictionary too can be based on an open, structure-independent design, and thus, can be accessed by other systems. A data dictionary designed according to open systems architecture may be used by BOREAL, ASTIS, and other systems. System X can design and devise a dictionary, system Y can access and use it across multiple hardware, software and communication modes in multiple locations.

Thus, data management makes data easily useable for a variety of applications, as well as by multiple users for the same application.

## Open Systems Interconnection

Open Systems Interconnection (OSI) stands for open exchange of information between systems resident on different manufacturers' hosts, using different software and different communication packages.

OSI comprises seven mandatory layers. See Appendix 1, Part I. Library applications form the seventh or top layer of the OSI layers. All seven layers have to be present in order for systems to intercommunicate.

Through OSI, different hosts can be designated to handle different portions of an application as more and more applications become decentralized or distributed.

Precise, explicit and pre-defined protocols are mandatory for sharing of information between and among systems. Protocols are necessary in machine communication just as they are in human communication.

Multiple systems under multiple jurisdictions (e.g. a government department, a research institute, a laboratory...), in multiple locations can share information if system design has incorporated OSI protocols. A good telecommunications system is also vital for systems to communicate with each other.

Standard messages, formulated according to the same protocol, e.g. CCITT's x.400 standard, are understood by other machines using the same protocol based on the OSI's seven layers. Each participant in a distributed system has the standardized intercommunication protocols.

Under OSI, a local system or database may have its own internal structure i.e. its freedom; but in order to communicate with other systems, a communication interface structure has to be agreed upon.

At the time of writing, several manufacturers, such as IBM, DEC, Sydney and Retix have OSI based products, which have all seven lower levels of the protocol stack incorporated. All major electronic equipment manufacturers are designing products incorporating file transfer and message transfer (FTAM) protocols. See Appendix I, Part II for an example of FTAM.

Treasury Board of Canada has an OSI policy, which encourages and influences development of products implementing OSI. The idea is that no system should be tied anymore to any one vendor's hardware or software.

#### CPIS on CD-ROM

Worldwide access to the entire CPIS database including periodic updates on CD-ROM (Compact disk - read only memory), wherever needed, specifically in the remote and isolated communities in the Canadian North would be a step in the right direction.

CD-ROM is a durable and portable storage medium for large amounts of data which so far could not be changed by software instructions. However, research towards erasable, reusable CD may revolutionize the industry (e.g. Thor-CD of Tandy).

A laser beam from a CD drive is focussed on the data track to read information on to a CD-ROM. A controller board mounted on a Personal Computer (PC), or a small computer serial interface, along with special software, allows a PC to extract information from a disk.

How would CPIS benefit from this technology? Some of the advantages are:

- Unlimited searching at fixed cost;
- Excellent storage medium: durable, compact;
- Portability;
- Self-paced learning at very low cost;
- Cost of an updated replacement disk goes down as the number of subscribers/users increases.

In terms of drawbacks: the retrieval is slow; initial cost of hardware and CD-ROM products is high at this time; specific hardware requirements limit freedom of choice.

However, end-user searchers and librarians alike, regardless of where they are located, would find periodically updated CD-ROM containing full text, graphics, citations, directories, etc. extremely valuable. The sense of isolation and inability of staying up-to-date as pointed out in Canada and Polar Science report would be reduced to a great extent.

A CD-ROM based CPIS would require the conversion of existing databases (BOREAL, ASTIS...) according to pre-established standards in an agreed-upon format and structure.

#### An Ideal CPIS?

I shall now endeavour to illustrate some of the implicit advantages of using new technology.

Can a properly designed CPIS on CAN/OLE communicate with NTIS, AQUAREF, WATDOC or other similar systems?

No, at this time it cannot be done, because CAN/OLE, like other local systems, has its internal structure and its own brand of query system. A user at a remote terminal has the host computer of CAN/OLE controlling the access because CAN/OLE has its own proprietary protocols at this time.

In a more open environment, CAN/OLE's host will be able to talk through any virtual terminal protocol to other mainframes to access another system through communication protocols.

If CAN/OLE installs a front-end containing all seven layers of OSI, a query languages (e.g. SQL) used to access CAN/OLE can also access another system using similar OSI products through the translation card.

#### Conclusion

In conclusion, I would like to state the obvious for anyone contemplating designing a CPIS, to keep in mind that they not only aim for meeting their own immediate needs, but also to keep in mind that systems designed today should

be able to link with tomorrow's systems. After all, that is what the theme (Northern Information: the Global Connection) of this Colloquy is all about. The emphasis should be on planning.

The following quotation on planning says it perfectly: "Our tendency is highly to overestimate what we can accomplish in one year, and highly to underestimate what we can accomplish in ten years." From Richard J. Foster's The Celebration of Discipline, pg. 94.

In an automated environment, a CPIS must meet the short range needs and must incorporate long range planning.

#### APPENDIX 1: PART I

##### OSI - SEVEN LAYERS

Physical layer:	Transfer of digital data across physical media. Plugs and connectors. RS232C standard of ETA.
Data Link layer:	Error free transmission over the path between the terminal and network. To transfer blocks of data and to detect/correct errors. HDLC protocol is an example of this standard.
Network layer:	To set up "source-sink path" for information exchange. CCITT's X .25 standard for packet switching network interface.
Transport layer:	To provide reliable, cost effective data transfer, flow controlled end-to-end as required. ISO std. IS 8073.
Session layer:	To establish and manage a dialogue between communications systems. Two-way simultaneous and two-way alternate operation. ISO std. IS 8327.
Presentation Layer:	To deliver data to application processes in recognizable format. Selection of appropriate syntax for data representation. ISO std. IS 8823.
Application layer:	To provide services to <u>users</u> of OSI, instead of to the next higher layer. To exchange semantically meaningful information. ISO std. IS 8571 on FTAM.

## APPENDIX 1: PART II

### OSI - FILE TRANSFER PROTOCOL: AN EXAMPLE

National Library of Canada's pilot project on file transfer protocol was implemented on five different hosts:

Honeywell CP6 at Carleton University.  
Cyber at University of du Québec.  
PDP 11/34 at University of Guelph.  
GEAC at University of Waterloo.  
IBM 3032 at National Library of Canada.

NLC as the record provider developed a conversion program, a file status query and an error reporting and billing mechanism. User capabilities to retrieve and transfer DOBIS and MRDS records were different. The project comprised several phases, e.g. transfer was

- first done on an item-by-item basis, (on-line)
- then in batch mode for off-line processing,
- then as part of MRDS: Selected Records Option.

File transfer protocol of NLC is based on ISO's FTAM standard. Search keys are matched for retrieval and transfer. Turn-around time is one day. The service is in batch mode. (File transfer is not the same as downloading).

MARC Record TRANSFER Service (MRTS) is a regular option on MRDS and DOBIS search services at this time for interested participants.

## APPENDIX 2

### ACRONYMS/ABBREVIATIONS USED

ACUNS	Association of Canadian Universities for Northern Studies
AORIS	Arctic and Offshore Research Information System
AINA	Arctic Institute of North America
ASFA	Aquatic Sciences and Fisheries Abstracts
AQUAREF	Canadian Water Resources References
BOREAL	Boreal Institute for Northern Studies, University of Alberta
CCITT	Comité Consultative Internationale Telegraphique et Telephonic
CAN/OLE	Canadian On-Line Enquiry
C-CORE	Centre for Cold Oceans Resources Engineering
C-FER	Centre for Frontier Engineering Research
CD-ROM	Compact Disk-Read Only Memory
CISTI	National Research Council's Canada Institute for Scientific and Technical Information
CPIS	Canadian Polar Information System
DBMS	Data Base Management System
DIAND	Department of Indian Affairs and Northern Development
DOS	Disk Operating System
FTAM	File Transfer and Access Mechanism
GRID	Global Resources Information Database
INAC	Indian and Northern Affairs Canada
NLC	National Library of Canada
NTIS	National Technical Information Service
OSA	Open Systems Architecture
OSI	Open Systems Interconnection
PC	Personal Computer
SQL	Standard Query Language
WATDOC	Environment Canada's Water Documentation System
WORM	Write Once Ready Many Times

## Cooperation--How Much Benefit?

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### Abstract

After a brief history of cooperation--practiced or proposed--between bibliographic facilities, the possibility of cooperation between the Scott Polar Research Institute at Cambridge University and the Cold Regions Bibliography Project at the Library of Congress is examined. Statistical data are presented, showing considerable overlap in the two services' subject coverage, and differences in their access to source materials. This leads to the conclusion that a cooperative arrangement could result in a reduction of effort while improving coverage. Specific areas of possible benefits, as well as obstacles to full cooperation are considered. It is announced that implementation of a common effort toward shared coverage of the antarctic literature has been initiated on an experimental basis. Finally, the possibility is held out that this initial project, if successful, could serve as a prototype of a multilateral scheme for bibliographic control of the arctic literature.

Cooperation between bibliographic services has always been one of the important topics on this group's agenda. The evolution of such cooperative efforts on the part of members of the Northern Libraries Colloquy has been described in detail by Martha Andrews at the tenth Colloquy in St. John's, and we refer you to her paper for this background information.

Our two organizations, the Scott Polar Research Institute (SPRI) at the University of Cambridge, and the Cold Regions Bibliography Project (CRBP) at the Library of Congress, have been involved in some limited bilateral cooperation ventures.

For a number of years the SPRI contributed to the catalog and database of the Boreal Institute Library by supplying catalog cards for analytic entries. In return, the Boreal Institute Librarian provided the SPRI with lists of selected references from Canadiana as an aid to expediting book selection. Since the cessation of card production at the SPRI Library this scheme has been discontinued. 1988 has seen the start of a new international collaborative exercise with the initiation of a pilot project exchanging computerized bibliographic records between the SPRI and Boreal Institute and

between the SPRI, British Antarctic Survey and Alfred Wegener Institut. It is hoped that a similar exchange will be initiated with the Librarian of the Australian Antarctic Division, where the SPRILIB computerized cataloging system is presently being installed.

On the part of CRBP the most significant achievement was to integrate its two bibliographies, the Bibliography on Cold Regions Science and Technology (CRREL Bibliography) and the Antarctic Bibliography into a single computerized database (COLD). This was reported at the 3rd Colloquy in Cambridge in 1973. Up to that time the two bibliographies had been produced by two separate groups, albeit under one management and in only slightly different formats. Control by a single management obviously facilitated the integration considerably. Interagency cooperation was achieved between CRBP and the National Institute of Polar Research in Tokyo, involving the exchange of quarterly accessions of COLD for abstracts of Japanese journal articles. Another cooperative arrangement was achieved between the CRREL Bibliography and the World Data Center A for Glaciology, as reported by Marilyn Shartran at the 7th Colloquy in Paris in 1978. Under this arrangement, WDCA, in exchange for hard-to-find documents, receives accessions of COLD on a quarterly basis and transfers these records into its own system with a few modifications. Possibilities of cooperation between COLD and the Arctic Bibliography (or ASTIS) were studied in 1972 and again in 1985, but these studies have, so far, not resulted in any action.

It appears, then, that interagency cooperation, except on a very limited scale, is not easy to achieve. The reasons for this (such as past practices, different user requirements, institutional constraints, marketing conflicts, etc.) have been often cited and we shall discuss the difficulties later. Why, then, did we decide to take another look at the possibility of much closer cooperation between our two projects? One reason is the recent mechanization of Recent Polar and Glaciological Literature (RPGL) that opens up new possibilities of data exchange. Another is the growing cost consciousness of sponsoring or parent agencies that encourages a search for shared resources. The volume of polar literature has been and continues to be in a mode of expansion and stationary bibliographic staffs find it increasingly difficult to cope with it.

Our first step was, as it had to be, an assessment of the subject interest shared by the two projects. We determined the number of items in 4 monthly issues of Current Antarctic Literature (CAL) and the equivalent four months of CRREL Bibliography. The total number of items (eliminating duplications) was 2,256. Of these, 1984 (88%) were pertinent to RPGL.

Conversely, we examined the number of items in a 4-month issue of RPGL that were also pertinent to COLD. We should remember that RPGL covers the whole cross-section of Arctic and Antarctic, as well as glaciological literature, whereas COLD's coverage is comprehensive for the Antarctic, but deals only with limited portions of the Arctic literature. The total number of items checked in RPGL was 1,487. Of these 940 (63%) were pertinent to COLD. Broken down by subject categories, the items pertinent to COLD showed the following distribution: Geophysics, 103 out of 235 (44%); Glaciology (except glacial geology), 625 out of 647 (97%); Glacial geology, 20 out of 97 (21%); Communication and transportation, 31 out of 50 (62%); Biology, 114 out of 230 (50%); and Social sciences, 47 out of 228 (21%).

The theoretical benefit to be derived by each project from sharing their handling of the overlap would be 44% (88% divided by 2) for SPRI and 31.5% for COLD. We say theoretical, because in order to achieve a practical method of sharing the work, various more or less burdensome practices would have to be introduced that would diminish, and possibly even nullify the gains.

There is, however, another aspect to the sharing of resources, besides savings resulting from avoidance of duplication. While covering some of the same topics, the two projects may not necessarily have access to the same sources. To gain some insight into the magnitude of such disparity in source materials, a count was made of the items in each bibliography that were pertinent to the other bibliography, but were not actually cited after a lapse of over 18 months. It turned out, that of the 1984 items in COLD that were pertinent to RPGL, 683 (34%) were not picked up by RPGL after a lapse of over 18 months, and of the 940 items in RPGL pertinent to COLD, 197 (21%) were not picked up by CRREL after a similar lapse of time. Stated in a different way, this means that 683 items (46% of RPGL's present 4-month output) could be added to RPGL's coverage, and 197 items (8.6% of present output) to COLD's coverage, presumably without significant additional effort, except for the initial investment necessary to implement the cooperative arrangements, and some added cost of data processing and publication. Viewed this way, cooperation would be a means for improving the quality of coverage, in addition to being more cost effective.

Savings (or improvements due to enhanced coverage) could be achieved mainly in three areas:

- 1) Acquisition, cataloging and abstracting burdens would be reduced within the percentages indicated.
- 2) Through exchange of databases both projects' holdings would be enriched as indicated.
- 3) If an agreement for joint publication were to be reached, this would reduce publishing (printing) costs.

On the negative side, there are the following hurdles to clear:

- 1) In the COLD bibliographic record, as presently designed, there are over 60 field designations for the different bibliographic elements; in the RPGL record there are 31 such designations. Many of these can be translated without much difficulty, but others would have to be added to each other's records, either at the time of initial input, or after transfer of the record. An example of such additional fields is Antarctic Bibliography and RPGL subject category designations.
- 2) There are, at present, different practices in handling the various bibliographic elements. To mention only a few, RPGL uses full names of authors, while CRREL uses initials only; the two projects use different transliteration systems; and the Antarctic Bibliography features substantive abstracts, while RPGL provides annotations and CRREL usually no abstract. Some of these could be

overcome by automatic conversion, others would require manual intervention.

- 3) Each project is automated in its own way, with different formats for data input and different computer programs for generating the various printed products. If we should aspire to electronic transfer of the bibliographic records, the two systems would have to be made mutually translatable, or a single computerized system would have to be agreed upon.
- 4) If savings were to be achieved in publishing, the present publications, or parts of them may have to be merged and distribution modified. We have not undertaken a study of our respective mailing lists, but know that many recipients of RPGL do not receive CAL and vice versa. Problems may also arise from the fact that CAL is distributed free of charge and RPGL on paid subscription.

It should be remembered that all the problems mentioned here are one-time difficulties. After a successful initial effort at resolving them they would cease to exist and there is no reason to believe that the new cooperative arrangements, properly planned and agreed upon, could not proceed effectively. We harbor no illusions, of course, as to the arduousness of the task. Some of the obstacles and possible pitfalls are formidable indeed.

Based on the above considerations, we felt that the idea of a common effort was realistic enough to warrant implementation on an experimental basis. Since most of our common interests are in antarctic literature we will initially concentrate on a trial exchange of antarctic records. We have begun automatic conversion of bibliographic records into each other's format. The next step will be the mechanical transfer of the records into each other's databases. If we find the experiment to have demonstrated the feasibility and desirability of the plan, we will then start shared coverage on an operational basis. We are thinking of dividing our responsibilities by country of publication, requiring each of us to deal with only half of the literature published. This could be phased in, beginning with books and papers published in 1989, and rapidly grow to complete sharing.

It is our hope that, should the project described here be successful, we may in effect have established a structure which can be expanded to include other polar bibliographic systems. Ultimately, we might see the COLD database as the joint product of a number of specialist polar information systems, with an expanded subject content, and being the source file of a number of new current awareness services published in a series of topical bulletins which replace the existing range of individual published bibliographies and accessions lists. At this advanced stage of the proposed project it may be feasible that the new, comprehensive COLD database could be supplied to each of the contributing libraries for downloading to local computer installations, or on CD-ROM, to provide inhouse online access, thus providing a major benefit for library users. In addition to this, we believe that such a scheme would substantially reduce the cataloging effort of each of the collaborating libraries and would simultaneously guarantee that the subject coverage and inclusion of gray literature references in COLD would be greatly improved.

### Acknowledgment

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# Submarine Exploration of the Arctic

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## Abstract

The polar regions are now of considerable importance to the world's nations from a scientific viewpoint. This presentation will trace the evolution of the Arctic submarine from the mid-1600s to the development of the first true Arctic submarine, the nuclear-powered USS NAUTILUS in the mid-twentieth century. The voyages of exploration which followed will then be highlighted and the presentation will close with a discussion of the Arctic submarine's scientific capabilities and potential for the future.

## 1. Introduction

The history of Arctic submarines is a sporadic one of ideas, concepts and actual experiences with vessels at sea. Like so many other areas of technology and exploration, progress has been far from systematic. The developments have tended to be discontinuous, and those by one nation or state were often not appreciated or incorporated into the thinking and designs of others, even those whose national interests lay in the polar regions.

Throughout the history of Arctic submarine development, technological capability often did not keep pace with vision. It is interesting that today the opposite is very much the situation: vision has not kept pace with technological capability. This is particularly true in regard to the development of a submarine for commercial purposes in the Arctic.

## 2. Early Concepts

### Bishop John Wilkins

The basic concept of an Arctic submarine, as well as the recognition of its potential for scientific and commercial advantage appears to have originated with a founder of the Royal Society, Bishop John Wilkins. In 1648, he published Mathematical Magick. Chapter V of this work addresses "the possibility of framing an ark for submarine navigations". Potential scientific and commercial advantages cited are: "...Tis safe...from ice and great frosts, which do so endanger the passages toward the Poles. It may be of unspeakable benefit for

submarine experiments and discoveries such as determination of the sources and directions of deep ocean currents and springs, and the nature and kind of fishes" /27/.

### Pre-World War One

More than two centuries elapsed before serious attention was again turned to the notion of an Arctic submarine in the mid-1800s. Jules Verne's Twenty Thousand Leagues Under the Sea seems to have been a major stimulus for this interest. Also contributing, was the fact that Arctic explorers were finding it virtually impossible to find a way past the great barrier of ice between them and the North Pole /16/.

In early 1898, an American, Simon Lake, made public his ideas for a submarine capable of navigation, exploration and scientific study in ice-covered waters /8/. In 1902, he designed and constructed the *PROTECTOR* which was especially fitted out for under-ice operations. During the winter of 1903, it successfully navigated and surfaced through ice in Narragansett Bay /8,9/. The Russian Navy subsequently not only purchased the *PROTECTOR*, but also six more Lake designed submarines of a later class. Several of these successfully operated in ice-covered waters shortly before World War One /8/. Lake's writings during this period indicate that he strongly believed that cargo carrying submarines fitted to under-run ice fields would shorten trade routes by opening up to navigation not only the Northwest Passage, but also new ports in northern Europe and Asia /8,9/.

### World War One

Although information is sketchy, it is known that submarines of the German Navy gained experience in operating in ice-covered waters in the Baltic Sea during World War One /7,8/.

### Post World War One

In 1930, Sir Hubert Wilkins announced his plan to use a submarine for polar exploration /19/. He then began extensive preparations for what was subsequently to become the world's first submarine expedition to the Arctic Ocean. Of particular interest is one of Wilkins' main objectives: "To demonstrate that submersible vessels may be used to transport at cheaper rates North American products...through the Hudson Bay route and across the Arctic...to Europe...." /26/.

The U.S. Navy placed the submarine O-12 at his disposal and Simon Lake undertook to convert it for under-ice operations with a number of controversial modifications such as a "sled runner" for gliding along the underside of the ice, an "ice drill" to cut through ice, and an airtight scientific observation and collection chamber /5,21/. Upon completion in 1931, the O-12 was rechristened the *NAUTILUS* /5/.

### Developments during World War Two

Military needs and combat experiences during World War Two stimulated the next significant advances in the steadily evolving technologies of the Arctic submarine. There is no doubt that significant numbers of Soviet submarines of

various classes conducted combat operations within, under, or in close proximity to ice /1,6/. In addition, German U-boats successfully patrolled in the ice covered waters of the northern Barents and the Kara Sea throughout the summer months of the War /25/. The collective conclusions of some of the most experienced German captains are most interesting: "A submarine is never helpless in the ice...because it can submerge, proceed under the ice, select an open area in the ice with the aid of its high-angle periscope, come to the surface, recharge the battery...and submerge again. It can dive and pass under all ice obstacles with the exception of the ice masses lying in shallow water (quoted in /25/). Interestingly, other observations and needs cited by German submarines, such as for under-ice acoustic detection equipment and special hull strengthening, were subsequently fully incorporated into modern nuclear submarine.

### 3. Post World War Two: The Development of a True Arctic Submarine

The years immediately following World War Two saw increased interest in the Arctic regions and the initiation of several important projects by the U.S. Navy, which were to have profound implications for the eventual development of a true Arctic submarine.

From 1946 to 1953, the U.S. Navy conducted a series of operations in the Arctic with conventionally powered submarines built during World War Two. These operations were for scientific research and to develop and test under-ice operating techniques and equipment. For example: During the summers of 1952 and 1953, *USS REDFISH* conducted extensive oceanographic projects in the Beaufort Sea. These voyages resulted in the first formal proposal for development of a U.S. polar submarine /24/.

In the late summer of 1957, *NAUTILUS* departed for the first of three deep penetrations beneath the Arctic ice. This first voyage took her within 180 miles of the North Pole. Lack of an effective ahead-looking under-ice piloting sonar caused her to turn back on her first attempt at a transpolar crossing in June 1958. However, *NAUTILUS* succeeded a month later in passing beneath the ice pack north of Alaska crossing the Arctic Basin in just 96 hours via the North Pole /2/. *NAUTILUS* thus became the first true Arctic submarine and ushered in a new era of submarine under-ice voyages for exploration and research purposes.

Of the voyages which immediately followed, those by the *USS SKATE* in 1958 and 1959 were particularly important. *SKATE* not only achieved the North Pole nine days after *NAUTILUS*, she also conducted the first winter operation in the Arctic, and became the first ship to surface at the North Pole /4/.

In early 1960, the *USS SARGO* entered the Arctic Basin via the shallow ice covered Bering-Chukchi Sea shelf and surfaced some 16 times through thick ice /15/. *SARGO* thus demonstrated an outstanding ability to conduct shallow water operations under the worst of ice conditions/15/. Finally, she also conducted the first submerged transit survey of the M'Clure Strait /12/.

During the summer of 1960, a fourth nuclear submarine, *USS SEADRAGON*, became, in Baffin Bay, the first submarine to ever closely examine and pass beneath icebergs. She was also the first to traverse the classic Northwest Passage, from Baffin Bay to the Beaufort Sea. Of particular commercial

significance is that *SEADRAGON* located a safe all-season deep water passage through the ice-clogged Barrow Strait /18/.

The era came to a dramatic conclusion during the summer of 1962 when *SKATE*, coming from the Atlantic by way of the Nares Strait, rendezvoused at the North Pole with *SEADRAGON*, which had come from the Pacific /10/. On her return, *SKATE* made the first west-to-east transit of the Northwest Passage /3/.

In 1963, construction began on a new "Sturgeon" class of nuclear attack submarine capable of year-round Arctic operations. Its special features and the general characteristics of the under-ice piloting sonar can be seen in Fig. 1.

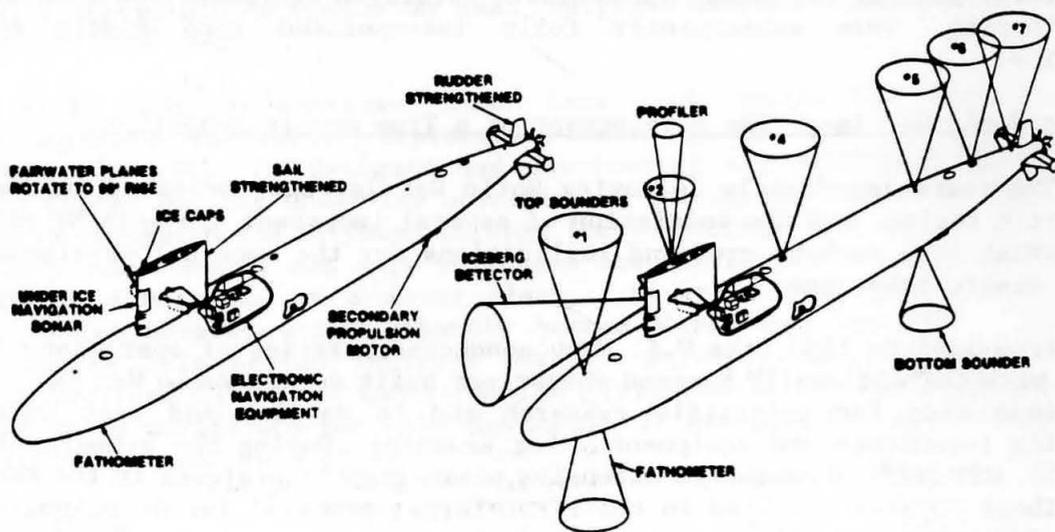


Fig. 1 "Sturgeon" Class Special Under-ice Operating Features /11/.

In a typical surfacing evolution, a polynya/lead of the requisite size is located, course is reversed, depth is decreased, and the submarine is maneuvered into a hovering position beneath its center. Once the topsounders indicate open water or sufficiently thin ice overhead, a vertical ascent to the surface is made.

The first of these all-year Arctic submarines to test its capabilities was the *USS QUEENFISH*. The voyages that followed were all by submarines with virtually identical operational characteristics and capabilities for scientific research. The principal polar cruises made during the period 1967-1983 are presented in Table 1.

#### 4. Scientific Attainments and Potential of Arctic Submarines

The submarine voyages listed in Table 1 have resulted in the collection of an enormous amount of oceanographic data. Each has contributed to the growing knowledge of the characteristics and limits of pack ice and icebergs, and of the contiguous marginal sea ice zone. Through sound velocity, temperature and salinity measurements, and passive and active acoustic observations,

such things as new subsurface currents have been discovered. Furthermore, they have assisted in more accurately delineating the layered nature and characteristics of the currents already known, such as the Arctic Surface Layer and the Atlantic Layer immediately beneath it.

Table 1. Principal Polar Cruises of US and British Submarines, 1967-83

Date	Submarine	Area	Major Accomplishment
Feb 1967	USS "Queenfish"	Baffin Bay	First single-screw nuclear submarine operations in and under the ice
Apr-May 1969	USS "Whale" USS "Pargo" USS "Skate"	Arctic Basin	Surfacing through thick ice and "ridge busting" experiments
Aug 1970	USS "Queenfish"	Arctic Basin Siberian Continental Shelf	Extensive shallow water operations using satellite navigation
Nov 1970	USS "Hammerhead"	Nares Strait, Arctic Basin	First autumn cruise
Mar 1971	HMS "Dreadnought"	Arctic Basin North Pole	First UK Arctic operation
Feb-Mar 1971	USS "Trepang"	Denmark Strait, Greenland Sea	*
Mar-Apr 1972	USS "Hawkbill"	Northern Bering Sea	Shallow water operations
Mar 1975	USS "Bluefish"	Greenland Sea Arctic Basin	*
Mar 1976	USS "Gurnard"	Arctic Basin Beaufort Sea	Extensive shallow water operations
Sept 1976	HMS "Sovereign"	Arctic Basin Greenland Sea	
Mar 1977	USS "Flying Fish"	Greenland Sea Arctic Basin	*
Oct 1978	USS "Pintado"	Arctic Basin, Kara Sea	*
Mar 1979	USS "Archerfish"	Baffin Bay, Nares Strait	*
May 1979	HMS "Sovereign"	Greenland Sea	*
Nov 1981	USS "Silversides"	Greenland Sea	The 100th nuclear submarine
Nov 1982	USS "Aspro" USS "Tautog"	Arctic Basin	First submerged rendezvous through ice at the North Pole

In the areas of applied science and technology, the experiences of these cruises have resulted in improved research capability. For example, capabilities developed for measuring the variability of sound speed due to changing temperatures, density, salinity and pressure will enable future cruises to more accurately delineate and measure the magnitude and direction of currents, internal waves, tides and large scale fronts and eddies. The Arctic submarine's scientific collection and acoustic tracking capabilities could also be of

considerable assistance in the solving of northern waters ecological impact problems, such as determining the effects of oil spills, and of man-generated low frequency noise emissions on marine life. The submarine's passive acoustic capabilities could also be developed to intercept, record and interpret subsurface transient acoustic emissions. This is a new area and could be of particular value in the location, identification, and sizing of marine mammal populations; and in the detection, location, and classification of icebergs, ice islands and of the myriad types of sea and pack ice.

Finally, the polar research submarine is vital for the collection of the information necessary for the modeling and analysis of the complexities of ocean circulation patterns and dynamics. In conjunction with data obtained through remote sensing techniques, the information could one day result in knowing what role the Arctic Ocean plays in the world's climate.

## 5. Conclusion

Although there has never been much hesitancy on the part of various nations in availing themselves of the submarine's many military capabilities, the vision of the world's maritime nations, particularly those with significant interests in the polar regions, has not kept pace with its rapidly increasing scientific potential. There is no doubt that submarines, let alone submarines under ice, are still beyond most people's vision of reasonable and safe transportation for scientific research purposes. Nonetheless, the time has now come to develop a research submarine for the Arctic because the day has already arrived when it could contribute significantly to the collection of oceanographic, sea ice and climatological data from an area which has now been clearly established as the cauldron of the climate of the Northern Hemisphere.

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# The Library Service at the Swedish Institute of Space Physics in Kiruna - A Centre for Mining and Space Research in Sweden

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## Abstract

Kiruna is the northernmost and largest municipality in Sweden, located above the Arctic Circle at about 68° N. The area has long been inhabited by the Laplanders, a nomadic reindeer herding people who have lived in northern Scandinavia for thousands of years.

LKAB - the iron ore mining company, operates the largest underground mine in the world and mining is the town's dominant industry.

Kiruna's high latitude and position are extremely favourable for auroral research and tracking of polar orbiting satellites. In the last few years Kiruna has developed into a center for space research with about 250 people employed in companies and industries involved in space-related activities.

The Library in the Swedish Institute of Space Physics maintains a collection of:

- 3500 reference books and textbooks
- 200 current journals covering the whole field of space physics
- sets of geomagnetic and ionospheric data from about 33 different countries, especially observatories in the auroral zone, including data taken at Kiruna, Lycksele and Uppsala in Sweden
- magnetometer and riometer data from Kiruna which are distributed widely in a graphical representation
- sets of data from the Swedish satellite Viking

The catalogue of the library collection is now being transferred to computer both to keep a full record and to aid users searching for titles.

## Introduction

Why is there a need for a Geophysics and Space Physics Library in a remote mining town in the Swedish Lapland? To explain this it is necessary to know something about the history of Kiruna.

### Some facts about Sweden

Sweden, with a population of 8.4 million living in an area of almost 500,000 km<sup>2</sup> is the fourth largest country in Europe. Half its land surface is covered with forest, less than 10% is farmland. Stockholm, the capital, is almost the same latitude as southern Greenland. Because of the Gulf Stream, Sweden, and even more so Norway, are not as cold as other countries at the same latitude. In July Stockholm has an average temperature of about +18° C. The winter temperature averages slightly below freezing and snowfall is moderate. Far northern Sweden has long and cold winters but in June and July the sun never sets. Sweden has rich natural supplies of coniferous forest, water power and iron ore. The largest iron reserves are in the far north.

### The Laplanders were first in Kiruna

The farthest northern geographical province in Sweden is Lapland. Kiruna is one of the two towns in the Lapland area and is situated 140 km north of the Arctic Circle at a latitude of about 68° N and with an area of about 20,000 km<sup>2</sup>.

The Laplanders, or "Sami" as they prefer to call themselves, were the original inhabitants of Kiruna. Only 300 years ago, the nomadic reindeer herdsman were almost alone in what was called Torne Lapland. The whole of northern Lapland was their territory, their meeting places were what is now the town of Kiruna.

Reindeer herding has been the basis for their existence for many hundreds of years. About 60,000 reindeer roam the wilderness around Kiruna, living high in the mountains in the summer and in the lowlands and forest during the winter.

Today, about one tenth of Kiruna's inhabitants are of Lapp origin and many of them still make their living by reindeer breeding.

### Kiruna's roots

The town of Kiruna was founded as a result of the discovery of rich iron ore deposits in the area. The first building in Kiruna dates from 1890. In the beginning, it was very much a "shanty" town. The huts were made from peat and boards. Nevertheless thousands of people made their way to the "Frontier City" drawn by the prospect of well-paid work in the mines. A young society gradually grew up in the wilderness. The first child born in Kiruna in 1899 was a girl, who was blessed with the name of "Kiruna" Söderberg. She married and had children but she died before her 30th birthday. Her husband is still alive, which shows that Kiruna is really a young town.

The first miners were a tough breed who worked in the open pits in the winter, sometimes at temperatures below -30° C.

The majority of the first people settling down in Kiruna came from other parts of Sweden and later on from Finland, so that is why three languages are spoken in Kiruna: Swedish, Finnish, and Lappish.

### The railway opened the mines

In earlier days the iron ore was transported from the mines by reindeer pulling Laplanders sledges called "ackja" to the coast area, 350 km south of Kiruna; so in 1902 5,000 men laboured to build, what was at the time, the northernmost railway in the world, from Kiruna to Narvik in Norway. This meant that iron ore from Lapland could be transported by rail to the harbour in Narvik, which is ice-free all year round and from there shipped to steel works all over the world.

### LKAB - The state owned mining company

The mining company became the dominant industry in Kiruna. For several decades, trade and industry in northernmost Sweden has revolved around LKAB. Today the iron ore is mined under ground and the work is highly mechanized. It is the largest underground mine in the world and there are almost 500 km of roadway underground.

In 1975, 5,000 people were employed in LKAB and the population in the municipality was just over 31,000. However, the demand for iron ore decreased rapidly and LKAB reduced the workforce to about 2,000 employees in 1987. Many inhabitants, mostly young people moved south and the population fell to 27,000, as it is today.

In order to solve the crisis with the mining industry, the municipality and LKAB jointly started projects to create new jobs, and this is proving successful.

The mining industry will, however, remain the base for trade, industry and employment in Kiruna for the foreseeable future.

### Space Research in Kiruna

Aurora borealis - the Northern Lights. Man has always been bewildered and fascinated by it. Today the aurora can be explained scientifically - but only to a certain degree. There are still many questions that have to be solved about the aurora.

This is the reason why Kiruna has become an important center of space research. Kiruna's high latitude and position are extremely favourable for research into the aurora. There are four institutions in Kiruna specialized in space research and together they employ about 250 people and the number is increasing steadily.

- Kiruna Geophysical Observatory was established in 1957. Later it changed its name to Kiruna Geophysical Institute and in 1987 the name was changed to The Swedish Institute of Space Physics (IRF).
- Esrange (Sounding rocket launching satellite) was established in 1964.
- EISCAT (European Incoherent Scatter Facility) was established in 1975.
- Satimage (Satellite image processing) was established in 1983.

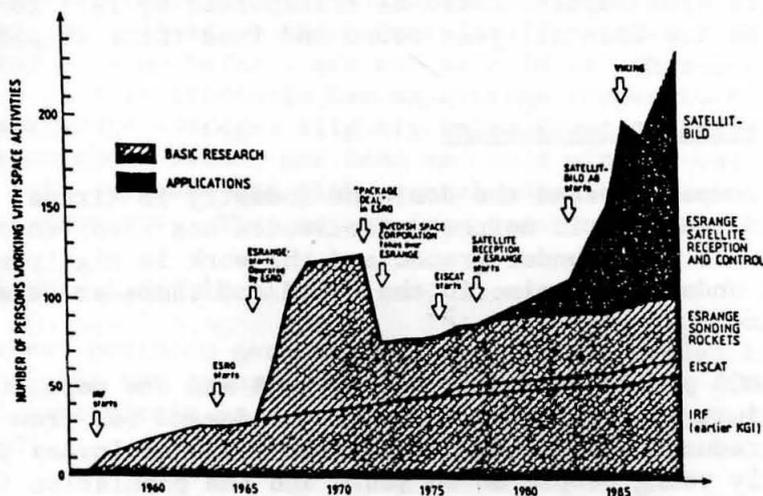


Figure 1. Development of space activities within the town of Kiruna.

### The Swedish Institute of Space Physics (IRF)

The main task of the institute is to conduct basic research and perform observatory measurements in the field of space physics. It also provides postgraduate education in space physics and in this respect, it is a department of the University of Umeå and of the University of Uppsala.

IRF consists of four divisions, each division has independent research programs and separate research grants. All of them together make a staff of 100 persons. The main office is situated in Kiruna with 60 people employed. This makes IRF the only Swedish governmental institute with its headquarters north of the Arctic Circle. The other divisions are in Uppsala, Umeå and Lycksele.

The main activities of IRF are research in:

- Basic space physics
- Rocket and satellite measurements
- Remote sensing by radio methods (RFA)
- Acoustical phenomena in the atmosphere
- Theoretical and experimental physics.

IRF builds their own scientific instruments to be launched in rockets and satellites. IRF will participate in many scientific projects in the near

future. The next one, to come in July 1988, is the ASPERA experiment which is to be flown on two Soviet Phobos spacecraft, a mission to the planet Mars and its nearest moon Phobos.

Scientists from all over the world come to visit IRF regularly.

### Esrange

The rocket launching site near Kiruna started in 1966 with sounding rockets. To solve the mystery of the aurora, balloons are launched rising up to about 30 km high, sounding rockets pass straight through the aurora and satellites measure it from above.

Esrange is also an important centre for control and reception of data from satellites. Data from the SPOT satellite, taken down by Esrange, are sent to Satimage for mapmaking.

### Satimage (Satellite image processing)

At Satimage satellite data are converted into pictures which give information about our earth - forests, water, geological secrets and more. This information is sold throughout the world.

### EISCAT (European Incoherent Scatter Facility)

EISCAT is a radar facility for ionospheric research which is owned jointly by six countries: Finland, France, West Germany, Norway, Sweden and the United Kingdom. There are two separate radar systems. Their transmitters are located in Tromsø and the receivers in Tromsø, Kiruna and Sodankylä.

The EISCAT data give information about electron density, electron and ion temperature, ion composition and plasma drift velocity.

Esrange and EISCAT in combination offer unique opportunities to measure auroral activity.

### The Swedish satellite VIKING

IRF, as well as Esrange and EISCAT, have been involved in the Viking project in different ways. The satellite was successfully launched in 1986; it ceased to operate about 15 months later, but it lasted twice as long as was expected. The satellite has provided a large amount of excellent scientific results. The particle instruments from IRF Kiruna have given more detailed energy and angular distributions than any other instrument flown in a polar-apogee orbit.

### The library at the Swedish Institute of Space Physics

#### Summary:

- |                         |                                |
|-------------------------|--------------------------------|
| • Staff                 | 1 (one)                        |
| • Budget                | US \$ 66,000 for the last year |
| • Classification system | Domestic system                |
| • Number of books       | 3500 reference and text books  |

- Number of journals taken regularly 200 covering the whole field of space research
- Number of data reports received regularly 200 series from 33 different countries
- Scientific reports, reprints and preprints 760 published and distributed up to May 1988
- Loan from other libraries Approximately 120 per year

### Scientific books and journals

The basic library has now grown to number about 3500 volumes and is increasing at about 200 a year. Ninety percent of the books and journals are in English and the rest in Swedish and German.

The increase in the number of books and journals has steadily created problems of space. The library was enlarged in 1981 when a new wing was added to the IRF building. At that time moving shelves were installed so that the library could also function as a conference room. Needless to say, the library is once again short of space. In the near future the Institute will be enlarged again and the conference furniture will be taken away from the library. This means that it will be used for library purposes only.

The library work is also expanding and temporarily there have been three people working in the library. The catalogue of the library collection is now being transferred to computer, both to keep a full record and to aid users searching for titles. This is mainly for the use of scientists working at IRF, EISCAT and other space research institutions in Kiruna. Library work also includes all the administration of the library.

The IRF library is, of course, a specialized library with the main section covering general and space physics, electronics and data handling. To these we have added a new section on remote sensing which is expected to become a large section very soon. These main sections are divided into more than 50 sub-sections using a domestic letter system.

One of the problems of a library in a rapidly changing subject like space physics, is that many of the books are almost out of date very quickly, therefore the current journals are the most important.

### IRF satellite data collection

Magnetic and riometer data are recorded in Kiruna on cassettes. The computer department at IRF stores them on magnetic tapes which are transferred to a discfile every month. Data are analyzed and tables and magnetic plots extracted.

Magnetic data have been stored in the archive at IRF on magnetic tapes since 1970. Earlier registrations are on paper from the end of the 1940s.

Riometer data have been registered since 1957 on paper and on magnetic tape since 1980, with paper copy as well.

Infrasound data are received on cassettes from the four stations Uppsala, Lycksele, Jämtön and Kiruna. The data are analyzed here and

transferred to magnetic tapes and stored here at the Institute. The microfiche are stored at the Sörfors station near Umeå.

Satellite data from the Swedish satellite Viking are stored on magnetic tape and on microfiche. We also store data from the European satellites ESRO 1 A and B, GEOS 1 and 2 and from the Soviet satellites Prognoz 7 and 8. The data are also available for guest scientists.

Eiscat-data. We store the Swedish part of EISCAT data on tape in the IRF archive. The original tapes are stored at the EISCAT headquarters which is in the IRF building. Other countries store their own EISCAT data.

An important role of the library at present is to publish summaries of geophysical data taken at Kiruna, to be distributed over the world and to store similar summaries received from many other geophysical centers such as Boulder. Kiruna Geophysical Data is distributed quarterly, summarized in booklet form.



Figure 2. The IRF Library with its space-saving shelves.

# The DOE Arctic and Offshore Research Information System

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## Abstract

The U.S. DOE has established a computerized information system to assist the technology and planning community in the development of Arctic oil and gas resources. This paper describes the DOE Arctic and Offshore Research Information System (AORIS), its development, which sources were accessed for inventory, examples of contents, and how it can be queried and used. The AORIS has an on-line thesaurus and user-friendly aids to assist in querying the AORIS. There are three principal components: a directory that lists 85 data bases containing Arctic energy-related information and how to access them; a bibliographic/management information system (B/MIS) containing over 8,000 references and abstracts on energy-related research; and a hierarchical scientific and engineering information system containing over 300 (about 600 when completed) data sets, in both tabular and graphical formats, on sea ice characteristics from the B/MIS citations. The AORIS also contains much of the so-called grey literature, i.e., data and/or locations of Arctic data collected but never published. Plans are being implemented to establish the repository of the AORIS with a university and/or a professional society. When the AORIS is being fully utilized, it will be a primary source for Arctic energy-related data in the development of offshore Arctic fossil resources.

## Introduction

The unique Arctic environment poses significant technological and economic barriers to developing Alaskan oil and gas resources. That is, the technical uncertainties associated with the development of offshore oil and gas resources in the Alaskan Arctic created a variety of engineering problems regarding structures, pipelines, and shipping in the offshore regions. These include ice forces on structures, ice accretion, the stability of seafloor soils on structures, and potential frost heave and subsidence problems created by subsea pipelines. Each phase of Arctic operations presents severe technical chal-

lenges that require clear identification of available scientific, engineering, and management information. This identification will enable industry to apply innovative solutions and assist researchers in defining information gaps and research needs.

The solution to the engineering problems identified above requires a wide range of Arctic information and data from a variety of sources. A large number of data bases or data centers currently exist that contain Arctic information and data. These data bases cover a broad range of Arctic information including history and culture, as well as engineering information. The U.S. DOE role in developing the AORIS is to provide a single source of easily accessible bibliographic and technical information which focuses on the needs of the offshore oil and gas community.

### Purpose and Objectives

The development of the AORIS is part of the programmatic activities of the Arctic and Offshore Research Program at the U.S. DOE, Morgantown Energy Technology Center. That program is involved in developing an energy-related knowledge base that will serve to improve the economics of fossil fuel production in the Alaskan Arctic and determining with more confidence how much Alaska can contribute in offsetting the known decline in future lower-48 oil and gas development. A centralized and computerized bibliographic and scientific information system is being developed and made available to the engineering, scientific, policy making, and planning community.

The principal objectives of this effort are (1) develop an on-line directory that identifies and describes other data bases containing Arctic energy-related information and how to access them, (2) develop a bibliographic/management information system containing references and abstracts on Arctic energy-related research, (3) develop a scientific and engineering technology information system containing quantitative data on sea ice and seafloor/soils characteristics, and (4) make the AORIS available via computer to the user community on a real-time basis.

### AORIS Development

The AORIS is a centralized, user-friendly, menu-driven, computerized information system containing bibliographic and technical information on the development of oil and gas in the Arctic, as well as a directory of where all the information (data bases and libraries) resides. The AORIS will be geographically dependent and, where possible, site specific. It will deal with the major topics (sea ice, geotechnology, oceanography, meteorology, and Arctic engineering) as they relate to offshore oil and gas exploration, production, storage, and transportation.

The AORIS was initiated in 1985, and is being developed incrementally with updates and additions to the information components to be made as appropriate. AORIS will be made available to the engineering, scientific, policy making, and

planning community. Figure 1 illustrates the AORIS development concept, its ultimate residence concept, and its purpose; to promote extensive private use of the Arctic technology in order to accelerate the development of domestic oil and gas resources.

In early 1986, a users' needs survey was conducted involving approximately 70 organizations from among the eight groups of stakeholders in Arctic energy development: Federal, state, and local agencies; university researchers; architecture and engineering firms; drilling contractors; consultants; and operators. Their specific information needs fell within a number of critical areas of Arctic R&D, as outlined in Table 1. Their recommendations are being used extensively in the development of the AORIS.

The primary recommendation was that DOE should initially focus on a limited number of topics -- those of greatest concern (i.e., energy development) and excel in their development. To meet this challenge, a technical review panel has been organized. Panel members, recognized experts on Arctic energy, were selected from the same groups that participated in the users' needs survey. They meet two or three times a year to review information and to recommend the direction for the further development of AORIS.

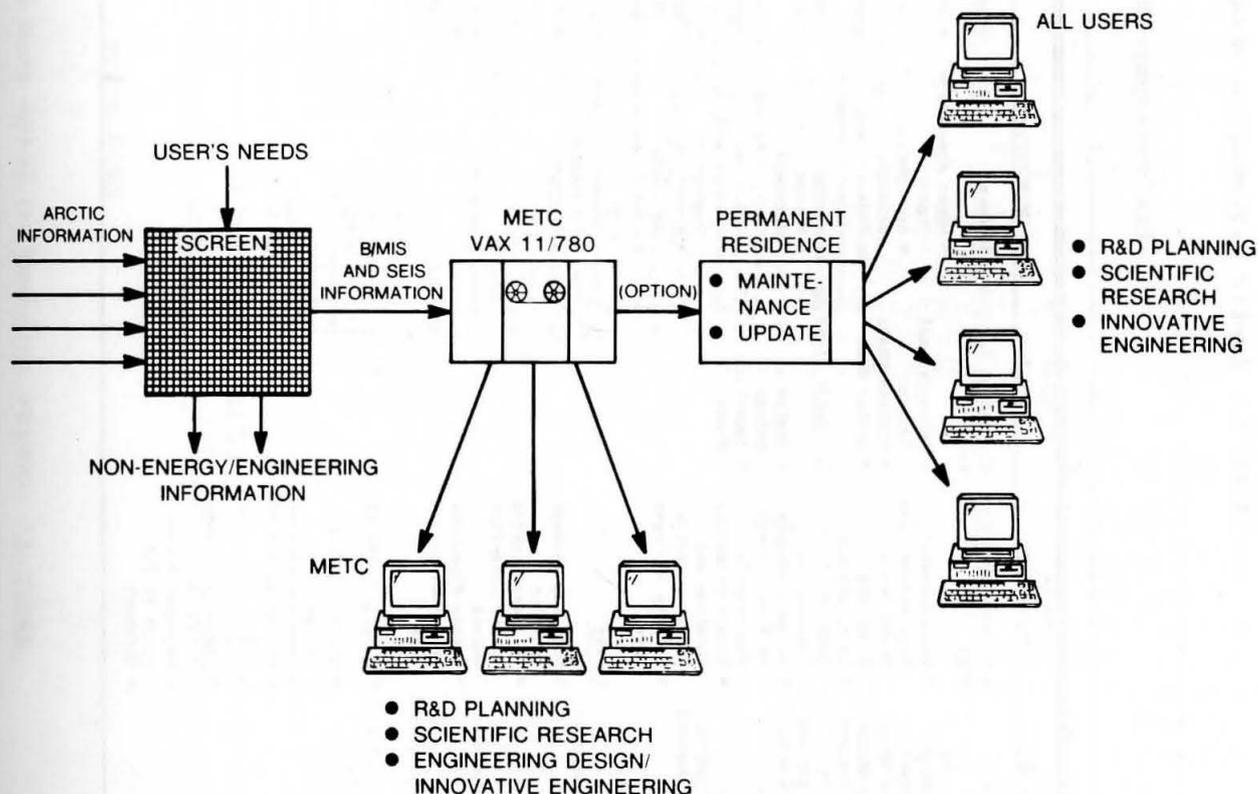


FIGURE 1. AORIS development concept.

TABLE 1. Arctic information needs from users' survey.

Bibliographic Needs

Federal Government	State Government	Local Agencies	Universities	A/E Firms	Drilling Contractors	Operators	Consultants
<u>Ice and Ocean</u>	<u>Ecological Environment</u>	<u>Ecological Environment</u>	<u>Sciences</u>	<u>Regulatory</u>	<u>AOGA Studies</u>	<u>Ice</u>	<u>Ice</u>
<ul style="list-style-type: none"> <li>• Structure and Composition of Arctic Ocean</li> <li>• Water Mass Movements and Impact on Ice Movements</li> <li>• Reaction of Marine Organisms to Petroleum or Petroleum Products</li> <li>• Ports and Harbors Studies</li> <li>• Under Ice Ambient Noise</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental Regulations from Other Arctic Countries</li> <li>• International Sources of Information</li> <li>• Seismic Effects on Fish, Larvae, and Mammals</li> <li>• Subsea Permafrost Location and Characteristics</li> <li>• Effects of Causes</li> </ul>	<ul style="list-style-type: none"> <li>• International Sources</li> <li>• Bowhead Whale</li> <li>• Arctic Haze</li> </ul> <p><u>Oil Spill Clean Up</u></p> <ul style="list-style-type: none"> <li>• Status of Technology</li> <li>• Impact on Coastal Areas</li> </ul>	<ul style="list-style-type: none"> <li>• Upper Atmosphere Physics</li> <li>• Atmospheric Sciences</li> <li>• Physical and Chemical Oceanography</li> <li>• Marine Life Sciences</li> <li>• Glaciology and Hydrology</li> <li>• Geology and Geophysics</li> <li>• Permafrost Research</li> <li>• Arctic Engineering</li> <li>• Terrestrial and Freshwater Biology</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental Consideration</li> <li>• Design Standards</li> </ul> <p><u>AOGA Studies</u></p> <ul style="list-style-type: none"> <li>• Reports</li> <li>• Titles</li> </ul> <p><u>Technological Development</u></p> <ul style="list-style-type: none"> <li>• Computer Models</li> <li>• Development Theories</li> <li>• Equipment</li> </ul> <p><u>Geotechnical</u></p> <ul style="list-style-type: none"> <li>• Geohazards</li> </ul> <p><u>Arctic Engineering</u></p> <ul style="list-style-type: none"> <li>• Ice Features</li> <li>• Failure Mode Conditions</li> <li>• Equations</li> </ul>	<ul style="list-style-type: none"> <li>• Reports</li> <li>• Titles</li> </ul> <p><u>Structure/Ice Interaction</u></p> <ul style="list-style-type: none"> <li>• By Region</li> <li>• Analogous Subjects</li> </ul> <p><u>Marine Transportation</u></p> <ul style="list-style-type: none"> <li>• Ice Breakers</li> <li>• Pipelines</li> <li>• Air Cushion Vehicles</li> <li>• Submarines</li> </ul> <p><u>Regulatory</u></p> <ul style="list-style-type: none"> <li>• Environmental Considerations</li> <li>• Maritime Law</li> </ul>	<ul style="list-style-type: none"> <li>• Ice Crystallography</li> <li>• Local Versus Global Ice Properties</li> </ul> <p><u>Other</u></p> <ul style="list-style-type: none"> <li>• AOGA Studies</li> </ul>	<ul style="list-style-type: none"> <li>• Summer Ice Dynamics</li> <li>• Factors Acting on Structures</li> <li>• Scope Protection for Artificial Islands</li> <li>• Ice Edge Phenomena</li> <li>• Ice Floes</li> </ul> <p><u>Other</u></p> <ul style="list-style-type: none"> <li>• Coastal Processes Affecting Erosion</li> </ul>
<u>Geotechnical</u>	<u>Safety</u>						
<ul style="list-style-type: none"> <li>• Subsea Permafrost</li> <li>• Sea Soils</li> </ul>	<ul style="list-style-type: none"> <li>• Drilling Through Pack Ice</li> <li>• Offshore Leaking in Ice Congested Waters</li> <li>• Subsea Pipelines in Transition Zone</li> </ul>						
<u>Other</u>							
<ul style="list-style-type: none"> <li>• Grey Literature</li> </ul>							
	<u>Oil Spill Clean Up</u>						
	<ul style="list-style-type: none"> <li>• Status of Technology</li> <li>• Fate and Effects</li> <li>• Oil Spill Tracking</li> </ul>						
	<u>Physical Environment</u>						
	<ul style="list-style-type: none"> <li>• Regional Differences of Ice</li> <li>• Currents</li> </ul>						

TABLE 1. Arctic information needs from users' survey (continued).

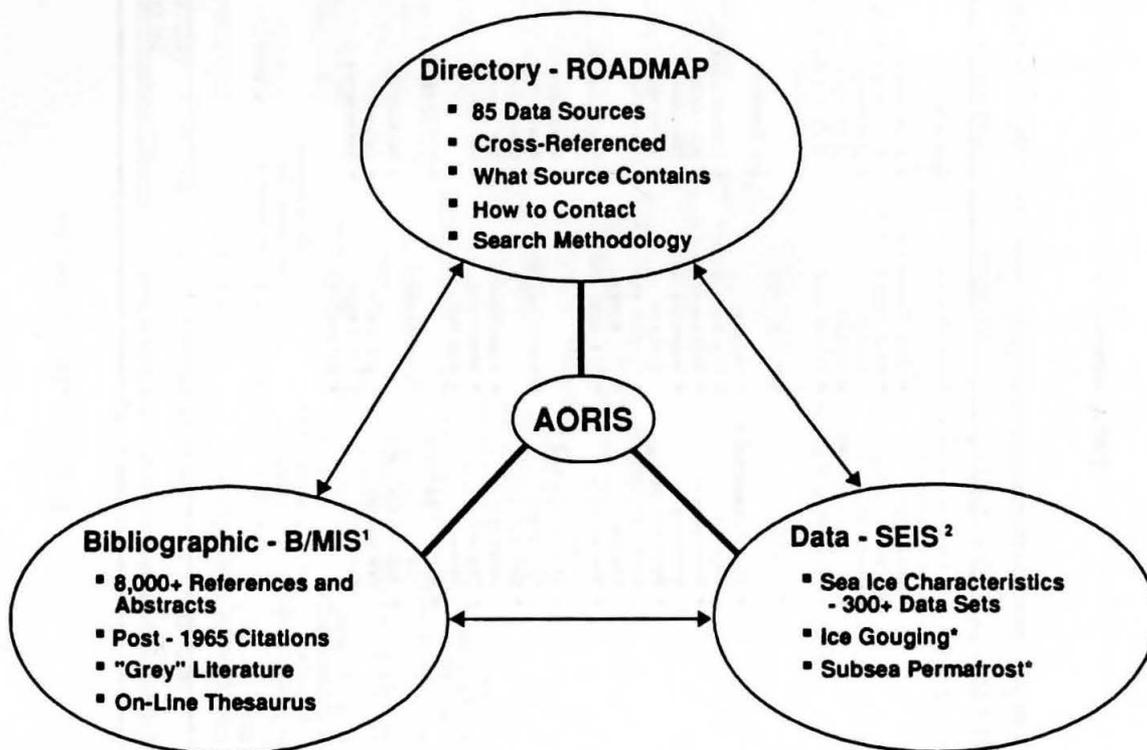
Data Needs

Federal Government	State Government	Local Agencies	Universities	Drilling A/E Firms	Contractors	Operators	Consultants
<p><u>Ice</u></p> <ul style="list-style-type: none"> <li>• Sea Ice Extent</li> <li>• Ice Composition</li> <li>• Ice Thickness</li> <li>• Location of Pack Ice Edge</li> <li>• Sea Ice Velocities</li> <li>• Ice Gouging</li> </ul> <p><u>Ocean</u></p> <ul style="list-style-type: none"> <li>• Bathymetric Readings</li> <li>• Drifting Body Data</li> <li>• Wave Energy</li> </ul> <p><u>Geotechnical</u></p> <ul style="list-style-type: none"> <li>• Seismic</li> </ul> <p><u>Atmospheric</u></p> <ul style="list-style-type: none"> <li>• Wind</li> </ul> <p><u>Other</u></p> <ul style="list-style-type: none"> <li>• Data Collections not Appearing in Journals (e.g., Current Data)</li> </ul>	<p>No Specific Suggestions</p>	<p>No Specific Suggestions</p>	<p>Need Extensive Data Bank to Conduct Comparative Analysis, Longitudinal Studies, Etc., Data Needed in Following Topics</p> <p><u>Sciences</u></p> <ul style="list-style-type: none"> <li>• Upper Atmosphere Physics</li> <li>• Atmospheric Sciences</li> <li>• Physical and Chemical Oceanography</li> <li>• Marine Life Sciences</li> <li>• Glaciology and Hydrology</li> <li>• Geology and Geophysics</li> <li>• Permafrost Research</li> <li>• Arctic Engineering</li> <li>• Terrestrial and Freshwater Biology</li> </ul>	<p><u>Geotechnical</u></p> <ul style="list-style-type: none"> <li>• Soil Properties</li> <li>• Soil Characterization</li> <li>• Seismic</li> <li>• Permafrost</li> </ul> <p><u>Ice Features</u></p> <ul style="list-style-type: none"> <li>• Islands</li> <li>• Pressure Ridges</li> <li>• Multiyear Floes</li> <li>• Scouring and Gouging</li> <li>• Stress and Strain</li> <li>• Thickness</li> <li>• Movement Velocities</li> </ul> <p><u>Meteorological</u></p> <ul style="list-style-type: none"> <li>• Wind/Waves</li> <li>• Temperatures</li> <li>• SAR Data</li> </ul> <p><u>Oceanographic</u></p> <ul style="list-style-type: none"> <li>• Currents</li> <li>• Ice Cover</li> <li>• Bathymetry</li> </ul>	<p><u>Geotechnical</u></p> <ul style="list-style-type: none"> <li>• Site Specific</li> <li>• Soil Properties</li> <li>• Geothermal Gradients</li> <li>• Soil Boring Data</li> <li>• Permafrost</li> </ul> <p><u>Ice Features</u></p> <ul style="list-style-type: none"> <li>• Concentrations</li> <li>• Strength</li> <li>• Thickness</li> <li>• Movement Velocity</li> </ul> <p><u>Meteorological</u></p> <ul style="list-style-type: none"> <li>• Wind Speed</li> <li>• Atmospheric Conditions</li> <li>• Ice Cover</li> <li>• SAR Data</li> </ul> <p><u>Oceanographic</u></p> <ul style="list-style-type: none"> <li>• Waves/Wind</li> <li>• Currents</li> <li>• Bathymetry</li> </ul>	<p><u>Ice</u></p> <ul style="list-style-type: none"> <li>• Ridge Statistics</li> <li>• Ice Gouging</li> <li>• Ridge Clearing Loads Around Structures</li> <li>• Loads on Structures for Winter and Summer Seasons</li> <li>• Properties of Ice Rubble</li> <li>• Multiyear Ice Pack</li> <li>• Thickness</li> <li>• Temperature and Salinity Profiles</li> </ul> <p><u>Ocean and Atmospheric</u></p> <ul style="list-style-type: none"> <li>• Currents</li> <li>• Bathymetric</li> <li>• Water and Air Temperatures</li> <li>• Wind Speeds</li> </ul> <p><u>Geotechnical</u></p> <ul style="list-style-type: none"> <li>• Sea Floor Resistance to Offshore Structures (e.g., Soil Shear Strength)</li> <li>• Seismic Readings</li> <li>• Sea Floor Permafrost</li> </ul>	<p><u>Ice</u></p> <ul style="list-style-type: none"> <li>• Material Properties of Ice</li> <li>• Ice Motion Data</li> <li>• Ice Thickness</li> <li>• Data from Ice Island Sensors</li> <li>• Satellite Imagery</li> </ul> <p><u>Ocean</u></p> <ul style="list-style-type: none"> <li>• Currents Throughout Water Column</li> <li>• Wave Heights (Hindcast)</li> <li>• Bering Strait Currents</li> <li>• Water Temperature</li> </ul> <p><u>Atmospheric</u></p> <ul style="list-style-type: none"> <li>• Wind Speed (Use to Infer Wave Height)</li> <li>• Fog</li> </ul> <p><u>Meteorological</u></p> <ul style="list-style-type: none"> <li>• Hindcast Data</li> <li>• Atmospheric Pressure</li> <li>• Air Temperature</li> <li>• Humidity</li> <li>• Cloud Cover</li> </ul> <p><u>Geotechnical</u></p> <ul style="list-style-type: none"> <li>• Data in Weak Zones (e.g., MacKenzie Delta has 0 Shear Strength)</li> </ul>

The AORIS is expected to be completed in early 1989. Efforts have already begun to establish a permanent AORIS residence that will be easily accessible by the public.

### The AORIS Components

The AORIS is composed of three components: the directory, the bibliographic/management information system (B/MIS), and the scientific and engineering information system (SEIS). (See Figure 2.) The three components are linked to each other, and by using special function keys, the user can move among the various divisions with great ease. The "help" feature is accessible at all times to assist the user.



1 Bibliographic/Management Information System

2 Scientific and Engineering Information System

\* May be included at a later date

FIGURE 2. Principal components of AORIS.

Directory -- The directory component of the AORIS assists those seeking the energy-related information by serving as a "road map" to the various data bases of interest and providing information on how to access them. The directory contains a listing of 85 major sources of Arctic-related data and library centers and provides the following information for each.

- A summary of the contents.
- The most efficient search methodology.
- Where the desired information resides.
- Who to contact to obtain the information.
- The telephone number(s) of the contact(s).

The major areas of Arctic information in the directory are:

- Arctic engineering.
- Geology and geophysics.
- Geotechnical.
- Glaciology and hydrology.
- Marine life sciences.
- Meteorology.
- Permafrost.
- Physical and chemical oceanography.
- Terrestrial/fresh water biology.
- Upper atmosphere physics.

The data bases are displayed in a matrix that lists them alphabetically, and cross references them with the ten topics. Figure 3 shows this matrix for the first 12 data bases whose titles begin with "A." This matrix gives a concise picture of the specific topics of Arctic information referenced by the sources.

The directory allows the user to review selected information from these specific data bases. Selections may be made in several ways: by one of the ten main topics, by various subtopics with respect to each main topic, from a matrix of data bases by topic (Figure 3), and by a specific data base title (or portion of the title). Figure 4 illustrates the information the directory provides when a particular data base is called up.

Bibliographic/Management Information System -- The B/MIS contains over 8,000 references and informational abstracts on energy-related research and engineering activities in the Arctic. It will provide much of the needed information on such topics as sea ice, ice gouging or scouring, seafloor/soils, subsea permafrost, seismic activity, pipelines, offshore structures, icebreakers, and subice hydrocarbon development technology.

AORIS DATA BASE LIST X-REFERENCES WITH TOPICS

DATA BASE	1	2	3	4	5	6	7	8	9	10
1 ACTIVE WELL DATA ON-LINE	X		X							
2 AERIAL PHOTOGRAPHY LIBRARY	X									
3 ALASKA CLIMATE CENTER						X				
4 ALASKA DEPARTMENT OF FISH AND GAME LIBR*	X				X				X	
5 ALASKA DIVISION OF GEOLOGICAL AND GEOPH*	X	X	X	X						
6 ALASKA OIL AND GAS CONSERVATION COMMISS*	X									
7 ALASKA RESOURCES LIBRARY	X	X							X	
8 AMERICAN PETROLEUM INSTITUTE MONTHLY CO*	X		X							
9 AMERICAN/CANADIAN STRATIGRAPHIC INDEX O*	X		X							
10 APILIT	X									
11 APIPAT	X									
12 AQUACULTURE						X			X	
1 ARCTIC ENGINEERING										6 METEOROLOGY
2 GEOLOGY AND GEOPHYSICS										7 PERMAFROST
3 GEOTECHNICAL										8 PHYSICAL & CHEMICAL OCEANOGRAPHY
4 GLACIOLOGY AND HYDROLOGY										9 TERRESTRIAL/FRESH WATER BIOLOGY
5 MARINE LIFE SCIENCES										10 UPPER ATMOSPHERE PHYSICS

RETURN to continue, or number of Data Base to View:

PF1	PF2	PF3	PF4	ESC-H
ROADMAP	BIBLIO	DATA	EXIT	KEY HELP

FIGURE 3. Roadmap cross-reference matrix.

The B/MIS centralizes references from currently available sources of Arctic energy-related information by including information that has already been catalogued by other sources. Figure 5 illustrates how the B/MIS pulls information from a wide variety of sources. A computerized data base search was conducted to establish a base line of currently available Arctic energy-focused references. This information is and has been enhanced by adding nonclassified military, international, and currently unpublished information or grey literature. Computerized information services, as well as libraries, universities, and private industry research contribute to the more focused AORIS objectives.

On-line bibliographic information systems use a set of key words to expedite searches of the topic desired. The user can search B/MIS using up to six key words at a time (Figure 6) or by using an author's name, a title (or the first six words thereof), a data range, or the unique AORIS identification number. If multiple search criteria are used, a logical AND is assumed. Figure 7 illustrates a completed search providing the first two citations with abstracts.

TITLE: COLD REGIONS

CODE: COLDREGN

TYPE: BIBLIOGRAPHIC DATA BASE

SUBJECT: Arctic and Antarctic Studies, Engineering

PRODUCER: Library of Congress, Science and Technology Division (support from  
Army Corps of Engineers CRREL and NSF)

ONLINE SERVICES: YES, SDC Information Services

GATEWAYS: EasyNet

PUBLIC: Yes

LANGUAGE: Russian, English, French

HARDCOPY: Yes

TIME SPAN: Earliest citations from 1951

UPDATING: 5,000 records a year, "Cold Regions Science and Technology"

CONTACT: Nancy Liston

PHONE: (603) 646-4221

ADDRESS:

U.S. Army Cold Regions Research and  
Engineering Laboratory  
72 Lyme Road  
Hanover, NH 03755-1290

Press RETURN for Abstract, N for Next Data Base

PF1

PF2

PF3

PF4

ESC-H

ROADMAP

BIBLIO

DATA

EXIT

KEY HELP

ABSTRACT:

The COLD Regions Data Base contains over 90,000 citations, with abstracts, to journals, monographs, technical reports, conference papers, patents, and maps on temporarily or permanently frozen areas, including the Arctic, Antarctica, the Antarctic Ocean, and the sub-Antarctic islands. The data base covers the political, social, and natural science aspects of these areas (except the Arctic), as well as the relationship of snow, ice, glaciers, and permafrost (frozen ground) to civil engineering, navigation, the behavior and operation of materials and equipment, and transportation. It also covers relationships of freezing temperatures to such activities as expeditions to cold areas, photography, reconnaissance, remote sensing, and construction. The data base corresponds to "Antarctic Bibliography," from 1962 to date, and "Bibliography on Cold Regions Science and Technology," from 1951 to data.

Press RETURN for Next Data Base, P for Previous Screen

PF1

PF2

PF3

PF4

ESC-H

ROADMAP

BIBLIO

DATA

EXIT

KEY HELP

FIGURE 4. Sample roadmap listed data base.

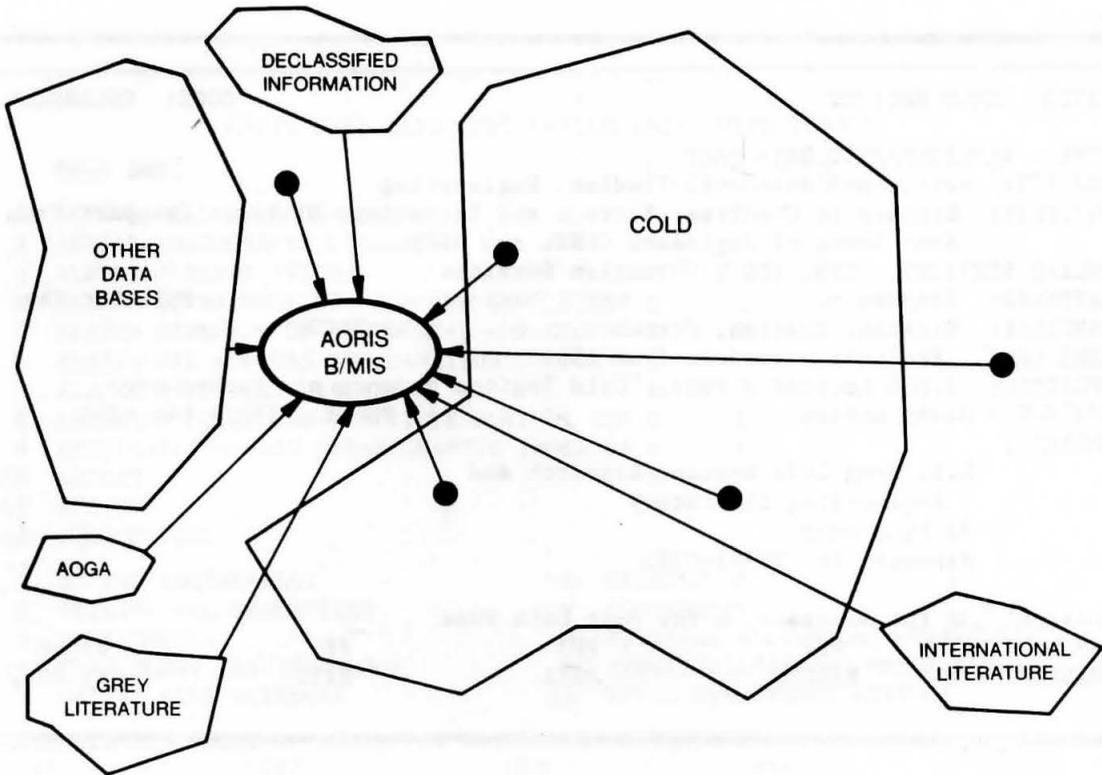


FIGURE 5. AORIS bibliographic component information sources.

```

                                BIBLIOGRAPHIC RECORD SELECTION

Keywords: PERMAFROST _____ See ROADMAP also
_____
_____
_____
_____
Author: _____
Title: _____
Date: _____ to _____
ID Number: _____

Are you ready to search (Y/N)? Y
*****
                                445 records were retrieved

List with Abstract or Quit (Y/N/Q)? _
Enter sequence number range: From _____ To _____ (RETURN for all)

Use CTRL/C to abort listing and respecify range
PF1      PF2      PF3      PF4      ESC-T      ESC-H
ROADMAP  BIBLIO   DATA    EXIT     THESAURUS  KEY HELP
  
```

FIGURE 6. Sample bibliographic record selection.

Sequence# - 1  
 ID Number - 1054  
 Title - IN SITU RECRYSTALLIZATION OF POLYCRYSTALLINE ICE  
 Author - WILSON, C. J. L.: MITCHELL, J. C.: BURG, J. P.  
 Doc Type - J  
 Language - ENGLISH  
 Date - 1985  
 Source - AUSTRALIAN NATIONAL ANTARCTIC RESEARCH EXPEDITIONS. ANARE RESEARCH NOTES, SEP. 1985-NO. 28, P. 122-129, 27 REFS.; ISSUE: AB VOL. 15 ITEM 32561

Keywords - ICE PHYSICAL PROPERTIES; ICE DEFORMATION; ICE CRYSTALS; ICE FLOES; ICE CREEP; ICE CRYSTALS; ICE MODELS; ICE DEFORMATION

Abstract - EXPERIMENTAL DEFORMATION OF ICE ABOVE -5°C PRODUCES DYNAMIC RECRYSTALLIZATION BY ROTATION OF SUBGRAINS AND/OR BULGING OF NEW HIGH ANGLE OR PRE-EXISTING BOUNDARIES, THROUGH A PROCESS OF MIGRATION RECRYSTALLIZATION. RECRYSTALLIZED GRAINS IN THE BOUNDARY OF AN OLD GRAIN UNDERGO THE GREATEST DEGREE OF ROTATION AND ALSO SHOW THE HIGHEST GRAIN BOUNDARY MOBILITY. SUPERIMPOSED ON THESE PHENOMENA THERE MAY BE POST-DEFORMATION "RECOVERY ANNEALING" WHICH PRODUCES LOCAL BOUNDARY MIGRATION WITH A FURTHER REDUCTION OF THE INTERNAL STRAIN ENERGY. (AUTHORS)

---

Sequence# - 2  
 ID Number - 1461  
 Title - EXPERIMENTS ON ICE RIDE-UP AND PILE-UP  
 Author - SODHI, D. S.; HIRAYAMA, K.-I.; HAYNES, F. D.; KATO, K.  
 Doc Type - PA  
 Language - ENGLISH  
 Date - 1983  
 Source - ANNALS OF GLACIOLOGY, REPT. NO. MP 1627, 1983-VOL. 4, P. 266-270, 48 REFS.

Keywords - ICE FLOES; ICE TEMPERATURE; ICE MECHANICAL PROPERTIES; ICE PILEUP

Abstract - ICE PILE-UP AND RIDE-UP ARE COMMON OCCURRENCES ALONG BEACHES IN THE SUB-ARCTIC AND ARCTIC. AN UNDERSTANDING OF THE FACTORS WHICH LEAD TO PILE-UP IS IMPORTANT FOR DESIGN OF A DEFENSIVE STRATEGY TO PREVENT DAMAGE TO COASTAL INSTALLATIONS. SINCE ICE ACTION ON A SLOPING BEACH IS COMPLEX, AN EXPERIMENTAL MODEL STUDY WAS UNDERTAKEN TO DETERMINE THE FACTORS WHICH PROMOTE ICE PILE-UP. THE FACTORS VARIED IN THIS STUDY WERE THE FREEBOARD, SLOPE, AND ROUGHNESS OF THE BEACH. ONE EXPERIMENT WAS PERFORMED TO OBSERVE THE EFFECTIVENESS OF A SHORE DEFENSE STRUCTURE AGAINST ICE RIDE-UP.

FIGURE 7. Bibliographic citations with abstracts.

To further facilitate these searches, the B/MIS contains an on-line thesaurus. Thus, if a familiar descriptive phrase is not a "legal" AORIS key word, the user can query the thesaurus for the appropriate key word. In order to provide a hierarchy of terms that will help the users narrow their queries to the narrowest appropriate term, the thesaurus is more detailed than most technical thesauri. At the same time, since it is specific to the B/MIS, it is less extensive in scope than most technical thesauri. The user can access the thesaurus from any area of the B/MIS component.

Scientific and Engineering Information System -- The SEIS component is still being developed. It currently contains over 300 tabular and graphic data sets from the B/MIS citations on sea ice characteristics. (Sections on ice gouging or scouring and subsea permafrost may be added, depending on the need expressed.) This portion of the data base was developed to provide a quick overview of the Arctic scientific data that is available. This allows the user to compare similar research results immediately on the terminal.

The sea ice data section concentrates on identifying data on the morphology, mechanical, and physical properties of the ice in U.S. waters (Beaufort, Chukchi, and Bering Seas). Within each major topic, data is categorized by ice type, such as multiyear ridged ice, first-year sea ice, and artificial ice. The sea ice data section will be expanded to contain ice-offshore structure interaction, ice movement, and ice distribution information.

The data gathering efforts focused on processed and/or analyzed data, thus the majority of information is displayed in graphical form, as demonstrated in Figure 8. Tabular data was also extracted from the scientific reports. Graphical and tabular data are presented as they appear in the original document to preserve the authors presentation of information. When movement data are retrieved, the drift patterns will be displayed as track maps.

#### AORIS Future

Only the prototype AORIS is operational on the DOE computer system in Morgantown, West Virginia, as of this writing. The completed version will be offered to the public in 1989. The current plan is to have some service organization(s) periodically update the AORIS and make it available to users on a cost-reimbursement basis. The service organization(s) may be a university, a professional society, and/or a data base service.

BIBLIO ID 22595  
 Variations of the Local Failure Pressure with Depth Through  
 First-Year and Multi-Year Ice.

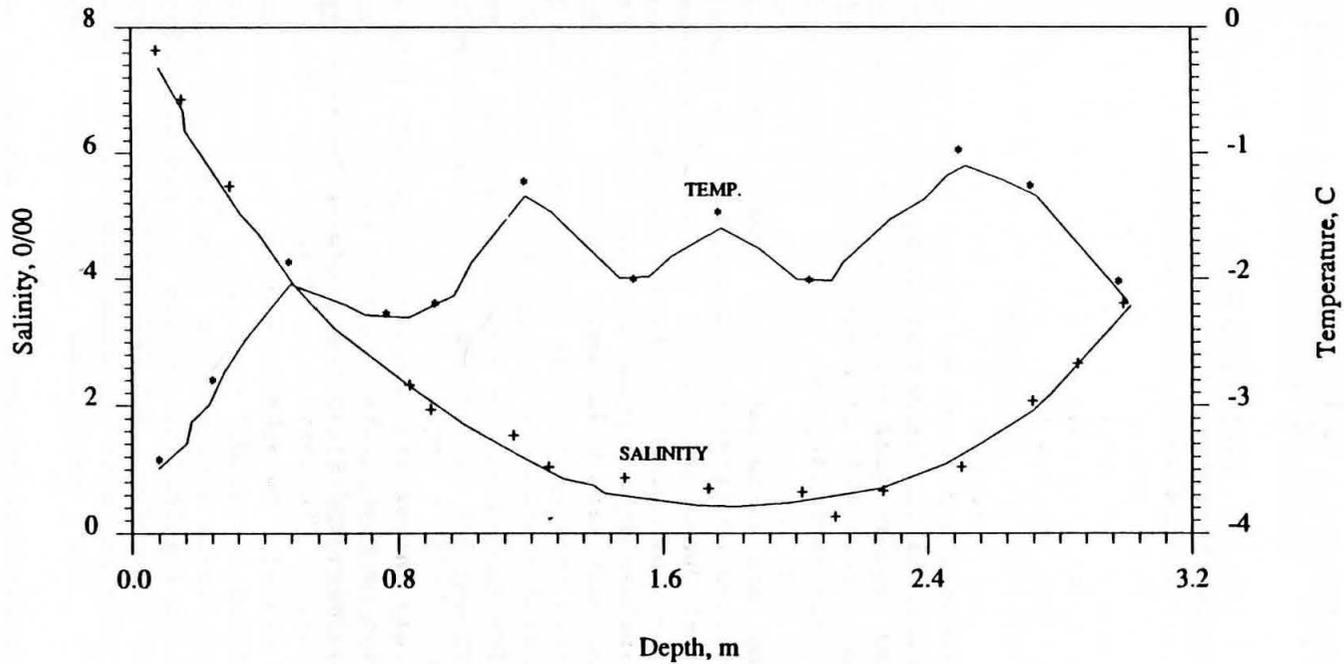


Figure 2a. Salinity & temperature profiles for continuous first year ice sheets (Frederking 1980)

FIGURE 8. Sample graphically presented data.

# Lanzhou Geoscience Centre of Chinese Academy of Sciences and Its Information Services

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## Abstract

The Lanzhou Geoscience Centre of the Chinese Academy of Sciences comprises the following geoscience research institutions in Lanzhou: Lanzhou Institute of Glaciology and Geocryology, Lanzhou Institute of Desert Research, Lanzhou Institute of Geology, Lanzhou Institute of Plateau Atmospheric Physics, Qinghai Institute of Salt Lakes, Northwestern Institute of Plateau Biology, and the Research and Development Centre of West China Resources and Environment. The Lanzhou Library of the Chinese Academy of Sciences offers book and non-book materials services to all the above institutions. The Earth Science Information Network of the Chinese Academy of Sciences is a joint program for resource sharing with the main office in the Lanzhou Library. Another network is the Geography Information Network of the Chinese Academy of Sciences with headquarters in the Geography Institute of the Chinese Academy of Sciences in Beijing. The Library of Lanzhou Institute of Glaciology and Geocryology is China's information centre of glaciology and geocryology.

This paper will discuss the Lanzhou Library of the Chinese Academy of Sciences, the Library of the Lanzhou Institute of Glaciology and Geocryology, and two networks and their information work.

The Lanzhou Library of Chinese Academy of Sciences was founded in 1955. It is the largest science and technology library in Northwest China. One of its principal collections is books and non-book materials in the geosciences. The total collection reaches 1.5 million including 1 million bound volumes, with 4,300 current serials and 100,000 U.S. government documents. It also collects microforms and purchases magnetic tape products, such as "Abstracts of Water Resources", "GeoAbstract", GeoArchive", etc.

The Lanzhou Institute of Glaciology and Geocryology, Chinese Academy of Sciences, was founded in 1958. It is a main research centre in China in the fields of glaciology and geocryology. Among the 388 staff, 278 are professional personnel. Its library has 19 staff, including 11 contract librarians. The library's collection has 30,000 books in glaciology and geocryology as well as their related subjects. Other holdings are 15,000 non-

book materials and 700 current serial titles. The library has established book and non-book materials exchange relations with 300 institutions in China and 170 institutions in 24 countries outside China.

In addition to its information services, the library is also in charge of editing and publishing academic literature and references for the parent body, and the proceedings of national conferences on glaciology and geocryology. This year's publications will be: "An Introduction to the Glaciers in China", "Quaternary Glaciers in East China and its Environment", "A Collection of Antarctic Scientific Exploration, Vol. 5. Glaciology", "Monograph of Application Research of Remote Sensing on Glaciers, Snow and Permafrost" as well as the multi-volume "Glacier Inventory of China". Those that have been completed in the last few years are: "Translation Papers of Glaciology and Geocryology", "A Bibliography of the Glaciology and Cryopedology in China and its Adjacent Districts", "A Bibliography of Serial Articles on Glaciology and Geocryology in Chinese", "index of Qinghai-Tibet Region Research", and "A Bibliography of Water Resources of the Urumqi River". Three serials for which the library is responsible are "Memoirs of Lanzhou Institute of Glaciology and Geocryology of Chinese Academy of Sciences", "Chinese Geographical Abstracts" (Chinese and English editions) and "Geographical Abstracts outside China".

Tianshan Glaciological Station of the Institute also has a small library with 2,000 volumes. It publishes the "Annual Report on the Work at Tianshan Glaciological Station".

The Earth Science Information Network of the Chinese Academy of Sciences comprises 34 research institutions and libraries in the fields of earth science, resources and environment. Its goals are publishing union catalogs of new titles purchased from other countries, publication exchange, resource sharing, reporting key scientific results and findings, inter-library cooperation, creation of bibliographic databases of earth science information, biographies of China's earth scientists, theses and dissertations of earth science, provision of information services to key research programs, and training, etc.

The Geographical Information Network of the Chinese Academy of Sciences comprises nine geography institutions in and outside the Chinese Academy of Sciences. The network has its own publications such as "Chinese Geographical Abstracts" (Chinese and English editions) mentioned above, "Abstracts of Geography Outside China" and "Subject Headings of Geography".

# Databases for Arctic Marine Technology

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## Abstract

This paper compares databases commonly used in searches dealing with arctic marine technology. Strengths and weaknesses of each database are listed as well as the degree to which the database covers the core publications in the field. Sample searches illustrate the overlapping coverage of the databases and the unique contributions of each database. None of the databases is perfect but the COLD database from the U. S. Cold Regions Research and Engineering Laboratory is a good place to start a search. Other databases can usefully supplement the results from COLD depending on the exact nature of the search.

## Introduction

The impetus for this paper came from a question asked at a Northern and Offshore Information Workshop held in Halifax, Nova Scotia in January 1986. Following the presentation on the Aquatic Sciences and Fisheries Abstracts database, someone wondered if it should now be the first choice as a database to search for marine technology, given the expansion of the ocean technology section of the database. I had been using the Engineering Index databases as my first choice but not for any better reason than convenient access. Therefore it seemed reasonable to give more careful consideration to the question of which database ought to be my first choice for arctic marine technology searches or at least what the merits were of each of the databases I normally use.

I investigated databases that covered arctic marine technology. By arctic marine technology, I mean ships and offshore structures in ice-covered waters. Earlier comparisons of arctic databases (Orr, 1977; Andrews, 1980) were concerned with coverage of a wide range of arctic subjects so their conclusions about the merits of various databases did not necessarily apply to their use for marine technology searches. Nor did they help answer the question of which ought to be the first choice.

To make a decision about what database should be my first choice, I looked for the following qualities:

- 1) regular full coverage of the core literature



method of counting was based on the assumption that a thorough, well designed search of the database would have retrieved all relevant citations. Where vocabulary design was a help or hindrance in retrieval, this is noted in Table 4. Not counted as duplicates were articles with the same author and title that were published in different places. Not counted as hits were the completely irrelevant citations (such as the shipping of iceberg lettuce).

The searches covered only material added to each database in 1985 for ease of comparison. Citations were checked to see if they would appear in the database in 1986 or 1987 or if they had appeared before 1985. They were also checked to see if they appeared in 1985 but had not been retrieved by the search strategy that was used.

In addition to the sample searches, the databases were compared by checking to see what portion of a list of core literature they covered (see Table 1). Also the published searches printed by NTIS from the NTIS, Engineering Index and Oceanic Abstracts databases (NTIS, 1983; NTIS, 1986; NTIS, 1987) were compared.

### Results

The coverage of core literature is shown in Table 1 and the costs of searching the databases is given in Table 2. The results of the sample searches is shown in Table 3. Comments follow each table.

Table 1  
Indexing of core literature

JOURNALS	ASFA	ASTIS	COLD	EI(M)	MARNA	NTIS	OAB
Cold R.	O	Y	Y	Y	Y	N	N
J. Ener.	O	O	Y	Y	Y	N	O
J. Glac.	N	Y	Y	N	N	N	N
Marine Tech.	Y	O	N	Y	Y	N	Y
Prob. Arct.	Y	O	Y	N	N	N	N
<b>CONFERENCES</b>							
Ann. Glac.	N	Y	Y	N	N	N	N
Ice Tech	N	N	O	O	Y	N	N
OMAE	O	O	Y	Y	O	N	O
POAC	N	O	Y	Y	O	N	O
IAHR	N	O	Y	O	O	N	N
OTC	Y	O	O	O	Y	N	Y
SNAME Trans.	O	O	O	O	Y	N	O
<b>REPORTS</b>							
CRREL	O	Y	Y	Y	O	Y	O

Y=regular coverage  
O=occasional coverage  
N=not covered

To evaluate the coverage of core literature, I created a list of journals, conferences and report series which as nearly as possible fit the definition of core literature as "works considered essential for the study of a particular discipline or subdiscipline" (Young, 1983, p.61). I created the list by consulting bibliographies, review articles and scientists familiar with the literature. I included only long established series and conferences which occur regularly. Items from these sources contributed about half the items in a selection of bibliographies of recent articles in arctic marine technology so the list seems to be a reasonable choice.

There are three major conference series that are important to arctic marine technology. They are the annual International Offshore Mechanics and Arctic Engineering Symposium (OMAE), sponsored by the American Society of Mechanical Engineers (ASME); the biannual ice symposium sponsored by the International Association for Hydraulic Research (IAHR); and the biannual International Conference on Port and Ocean engineering under Arctic Conditions (POAC). Useful papers have also appeared regularly in the publications of the Society for Naval Architects and Marine Engineers (SNAME) whose Transactions, Ice Tech meetings and journal, Marine Technology (Marine Tech.), are included in the core list. The Offshore Technology Conference (OTC), is included since authors in private industry often choose to publish in OTC and not elsewhere.

Cold Regions Science and Technology (Cold R.) is the major journal in the field, followed by the publications of the International Glaciological Society, its Journal of Glaciology (J. Glac.) and the Annals of Glaciology (Ann. Glac.), a serial which publishes the proceedings of conferences. The Journal of Energy Resources Technology (J. Ener.) (superseded in part by the Journal of Offshore Mechanics and Arctic Engineering) is published by ASME in addition to the OMAE conferences. Problems of the Arctic and Antarctic (Prob Arct.) is included because it is the main English language outlet for Russian articles in this field.

There are numerous sources of reports on arctic marine technology but only the series from the U. S. Army Cold Regions Research and Engineering Laboratory (CRREL) forms a sufficiently large and often quoted collection to merit inclusion in a core list.

To summarize the results in Table 1 briefly, COLD has the best regular coverage of the literature. ASFA, ASTIS, EI(M) and MARNA cover at least 60% of the titles on at least an occasional basis. OAB is weaker in its coverage and, of course, NTIS does not attempt to cover journals and conferences in a systematic way. I counted journals and conferences as indexed only if there were citations for individual papers from them so, for example, a citation to a POAC conference on NTIS does not mean that it is covered by NTIS.

Table 2  
Cost of searching

DATABASE	CONNECT TIME	OTHER COST	AVERAGE COST
ASFA	\$40	-	\$2
ASTIS	\$90	\$10/4 weeks	\$12
COLD	\$125	\$.19/ref.	\$11
EI(M)	\$109	\$.28/ref.	\$10
NTIS	\$71	\$.25/ref.	\$7
OAB	\$126	\$.65/ref.	\$15
MARNA	\$35	\$.78/system billing unit	\$21

Charges are given in Canadian dollars for the databases searched on the system I used for my sample searches. The average search costs are the averages of about ten recent searches done in my library or the Queen Elizabeth II Library at Memorial University of Newfoundland. The higher average costs for ASTIS and MARNA may reflect in part a combination of our relative inexperience in their use and their uncommon software. MARNA's low connect time charge is misleading because the greater part of the charge comes from the "system billing unit" charge which is related to CPU use.

Table 3

	Database uniqueness in sample searches						
	ASFA	ASTIS	COLD	EI(M)	MARNA	NTIS	OAB
Total	26	112	126	148	39	25	21
Unique	1	62	76	36	11	12	3
% of unique	4%	55%	60%	24%	28%	48%	14%

The search results compared in Table 3 are the combined results of searches 1 and 2 in Figure 1.

The unique items in ASFA and OAB were short descriptive articles. The ones in ASTIS were largely Canadian and/or trade journal items. Russian items made a large contribution to the high percentage of unique items on COLD. Retrieval on MARNA is artificially low because the search strategy did not take advantage of the very precise index terms. Many of the non-unique items on MARNA were nonetheless interesting because they appeared on MARNA before they appeared on the other databases.

If budget considerations limit the number of databases to be searched, the following results from the sample searches may offer some guidance in choosing useful combinations of databases:

-The combined results of COLD, ASTIS, EI(M), MARNA and NTIS covered all the substantial articles on ASFA and OAB as well.

-The combined results of EI(M) and ASTIS covered about 80% of the total number of citations retrieved.

-Combined results from COLD and EI(M) covered about 65% of the total as did the combination of COLD and ASTIS.

-Combined results from EI(M) and one of ASFA, MARNA, OAB or NTIS covered about 60% of the total.

-COLD with one of NTIS, ASFA, MARNA or OAB covered about 50% of the total.

### Summary

Table 4 gives the strong and weak points of each of the databases, especially in the areas of coverage, software, indexing, currency and cost.

Table 4

BASE	Strengths	Weaknesses
ASFA	Covers reports Inexpensive Useful index terms	Very little unique material Relatively slow to add new material
ASTIS	Canadian material Grey literature Good index terms for ice	Irregular coverage Little or no coverage of publications from the Society of Naval Architects and Marine Engineers Combining large sets difficult with current software
COLD	Comprehensive coverage of core literature Unique coverage of Russian language material Good coverage of arctic conferences	Missing some articles from ship sources Not many ship index terms
EI(M)	Good coverage of arctic and marine material in general engineering literature	Irregular coverage of conferences e.g. OTC to 1983 only Index terms very broad Very little coverage of report literature

MARNA	Good coverage of ship literature European language material European conferences Numerous specific index terms Good currency - delays as short as 1 month	Very little indexing of reports Truncation difficult with current software Complicated method of calculating charges for a search - not available through a major vendor
NTIS	Reports, both U. S. and other countries	Conference papers not indexed Very little journal coverage
OAB	Shipping trade journals indexed including short ship descriptions and news items	Little substantial material that is not indexed elsewhere

To summarize what Tables 1-4 say about the merits of each database, let me return to the list of merits I considered.

1)coverage - COLD has the best full, regular coverage of the core literature. All the relevant papers from core conferences and journals are normally indexed in COLD while other databases were more selective and less faithful in covering each conference in a series.

2)software - ASTIS and MARNA are on systems that do not allow the searcher the same freedoms, especially in truncation, as are available in the other databases. In ASTIS, this is because the system does not allow large sets. In MARNA the truncation process itself is very slow.

3)indexing - COLD and ASTIS have good indexing for ice but are not as strong on ship-related subjects. ASFA and NTIS are reasonable for both ships and ice, EI(M), OAB and MARNA are better for ships. To evaluate the indexing, I checked the thesauri or printed subject indexes for words describing different types of ice and standard naval architecture terms to supplement the general impressions I had gathered from using the databases.

4)currency - Since an average index can have a delay of from 1 to 15 months from the time an article appears until it is indexed (Katz, 1987, p.124), probably none of these databases should be described as unusually slow. However, in the sample searches, only MARNA had a majority of articles from 1985. NTIS and EI(M) had about the same number of 1985 articles as articles from previous years. The other databases had a considerable amount of material from previous years. MARNA should therefore probably be the choice if currency is of primary interest.

5)estimating costs - Only MARNA has a cost structure that makes the cost difficult to estimate or calculate at the end of the search. The vendor plans to improve the situation somewhat by making it possible to at least calculate the cost at the end of the search.

In short, COLD is a good place to start a search because of its regular, full coverage of most of the core literature. This was illustrated in the sample searches by its high retrieval and uniqueness rate. The retrieval

software and indexing are good and the currency is about average. The hourly cost is high, but the average search cost is comparable to all but the cheapest databases and the cost is justifiable in terms of the quality and quantity of the citations retrieved.

Can we then be content to just search COLD? Unfortunately not based on the evidence of the sample searches and my experience. Substantial and relevant articles were retrieved from ASTIS, EI(M), MARNA and NTIS that were not found in the COLD database. Reasons to search each of these other databases in addition to (or even in preference to COLD) are:

1.ASTIS - to find additional Canadian material and the odd paper not indexed by COLD from major conferences covered by both databases.

2.EI(M) - to find articles in mainly engineering journals and conferences as well as some ship literature.

3.MARNA - to find articles in ship journals and conferences and to look for core ship articles that have not been indexed by COLD yet.

4.NTIS - to find reports from the David Taylor Research Center (the major American government ship research organization) in particular and in general, any U. S. report not found in COLD.

Although COLD is a good first choice, the subject of the search and possible cost restraints will enter into the decision about which other databases are appropriate.

#### References

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# **A Northern Village Under Change: A Study of the Effects of Experimental Construction Activities on Community in Kilpisjärvi**

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## Abstract

The report deals with the Kilpisjärvi research project. The objective of the project is to advance the architecture and construction techniques in a cold climate. The research can be divided into technical and social components.

Kilpisjärvi is located at 69°N 21°E. The village is a modern pioneer community in the northern region. These pioneer communities have not been studied very extensively.

As a result of the construction, the households and the economy of the village will begin to generate side-effects. As a new process this would be conveyed to the social structure and life style, and may have profound social consequences. The phenomena revealed during the construction show that it is not merely a technical procedure or productive activity. In the north it is shaping life and may upset both the economic balance of the community and other bases of social life.

## Background of the research

The report deals with the Kilpisjärvi research project. The objective of the project is to advance the architecture and construction techniques in a cold climate. The study was prompted by the observation that Finnish architects and builders do not sufficiently know the prerequisites set for construction by the arctic environment. The construction standards designed for southern Finland are not, as such, applicable to northern circumstances. Nor are the construction specialists familiar with the life and life style of the north, which deviates from that of the south in both its primary terms and content.

On the other hand social scientists and anthropologists have not studied new and changing arctic communities. Our knowledge of the life style and conditions of modern people in northern villages is insufficient. However, new villages are being built for exploitation of minerals and other resources of the arctic zone. We need knowledge to try to avoid making mistakes. Construction is not merely a technical procedure; it shapes life as well.

## The realization of the research

The research project has been divided into technical and social components. The technical research is being carried out by the Technical Research Center of Finland. It comprises three main themes: (1) the follow-up and development of construction sites; (2) the development of the composition of insulating materials and the heating techniques of houses and out-of-house plumbing systems; (3) the study of snow-drift formation and the durability of the composition of insulation materials in severe circumstances as determined by location of houses and construction solutions.

The social component of the research is being carried out by the Department of Social Sciences at the University of Lapland. The main objective is to produce information on living and communities to serve the construction in the north. The study comprises three themes: (1) the basic mapping of the community and residential aims in the north; (2) the analysis of the effects of construction activities on the community; (3) the analysis of the actualization of residential goals.

The research material will have been compiled in three phases. Before beginning the construction, a basic mapping of residential goals and the life styles was carried out. The material on the beginning changes in life styles and the experiences of the construction activities have been compiled during construction. Upon completion of the construction, the material on changing life styles will be elaborated and the material on the actualization of residential goals will be compiled.

## The goal of the research

The social studies of northern regions have been focused mainly on the lives of indigenous peoples and their adaptation to the environment as well as the acculturation of the indigenous peoples and the concurrent problems. However, modern pioneers are also found in the northern regions. These pioneer communities have not been studied very extensively. The subject has been ignored. Social scientists have studied modern villages in the central region of society and anthropologists traditional communities in the periphery. Very few have been interested in new villages without a history in regions of traditional communities.

The present research focuses on the village of Kilpisjärvi, which may be considered a type of modern pioneer village. It actually came into being only in the 1940s, after the construction of a road. In ethnic structure Kilpisjärvi is a Finnish village surrounded by a reindeer-herding Sami settlement. The village is not really arctic. It is located at 69°N 21°E. Its location in the middle longitudinal zone of the northern hemisphere and within the sphere of influence of the Gulf Stream means that the circumstances are not as harsh as in many corresponding regions further east or west. The village is mainly subarctic, a good 80 kilometers north of the fir tree zone and remote.

Kilpisjärvi is a village without a history. It has not as long a history as rural villages in southern Finland. No one has grandparents who have lived in the village. There are not any historical monuments. The village is young. Its existence is based on the development of leisure time

in the industrial society, knowledge needs of the outside society and the expansion of the tasks of public sector after the Second World War.

The pioneer character of the village is evident in the structure of the population. The inhabitants are settlers from elsewhere, young and fairly well educated. In these respects the structure of the population is substantially different from the structure of the populations of Finnish rural villages. For instance, in 1985, when the research commenced, the median age was 31 years. The people work within the fields of tourism, auxiliary tasks of research, commerce, and civil service at the Norwegian and Swedish borders. The population of the village has changed quickly. The community has been a way station for those seeking shelter or the meaning of life.

The climate influenced the choice of Kilpisjärvi as a research locality. The choice was also influenced by the fact that the standard of housing was low and not enough housing was available. Not all of the earlier dwellings were suitable in the cold environment because of the architecture and construction techniques. The village did not have quarters for school, exercise, health services, or a library. These were included in the construction plan. Besides the research, the construction project had the objective of creating a community adjusted to and functioning in its environment at Kilpisjärvi.

#### The basis of residence and economy

Nature is the basis of living. Man's way of creating productive activities to satisfy needs of subsistence forms the basis of social living. Productive activities, housing and formation of communities are all intertwined.

In the subarctic the natural energy cannot be utilized directly through vegetation. Energy is collected from nature by utilizing the reindeer, birds and fish. The reindeer has been the most important element in the formation of the Sami culture. If the economy is not anchored to an extension of the ecosystem, outside connections are required. The economy of Kilpisjärvi is based on the following outside connections: (1) the research on and conservation of the natural environment; (2) leisure time and its increase; (3) the geopolitical situation and government tasks in the border zone; (4) frontier trade and commercial services; (5) social services directed to the region.

The economy of Kilpisjärvi might be characterized as being bipolar; the basis of the economy and of market economy. Service industries are the emphasis of the market economy. The economic system of the village is characterized by a substantial subordination to external factors. A distinctive feature of the economy of the village is instability; it shows extreme variations.

#### Features of community and life styles in Kilpisjärvi

Should Kilpisjärvi be characterized as a community on the basis of the interviews carried out, it would be described as a peripheral village with total features. The total features of the community are shaped by the following circumstances: (1) the inhabitants have only occasional connections with the rest of the society; (2) essential decisions are made

outside the community and the possibilities of self-government are appraised as minor; (3) the choices pertaining to work and employment are limited; (4) the usual activities, work, rest and leisure time take place in the same locality; (5) there are tensions between the village and the surrounding culture.

The total features emerge from the isolated locality, subordination of economy to exterior factors, limited choices and conflict with the surrounding culture. Totalism is not an uncommon phenomenon in northern communities. It has been seen in Finland in Sevettijärvi in the village of linguistically and culturally isolated Skolt Lapps. It is seen in work communities exploiting the arctic region. There are, however, clear differences between the total aspects of these different communities.

Although features of a total community, brought about by external factors, are seen in the village, the villagers do not appraise the community as particularly distressing in their everyday lives. The surrounding nature offers an escape. Perhaps more important than nature is the way one has come to the village and settled there. Only a few stories describe the move as having been such a forced event as is usual in the cases of moving from rural to urban areas. At first it may have been a move into a remote area in order to reconsider the direction of one's life. On the other hand, for some the move has been part of career development. It was regarded as a certain temporary phase in life which but turned out to be permanent. The people adjusted and stayed in the region.

Settling in an area where one encounters people who are of about the same age and have similar background experiences is different from the forced moving from rural areas based on economic determination. Moving to Kilpisjärvi is not always felt as being such an inevitability as the forced moving the rural areas, even if it does entail changing jobs and a narrowing of life space from one's previous environment. The choice of place of residence and the exceptional direction of the moving is associated with the realization of goals set by the people themselves. The change of work as dictated by structural changes of production is not the only aspect of the move.

#### The communal effects of construction activities and living

Rural and northern living cannot be discussed without considering man's relationship to nature. The walls do not describe the living quarters or the home. Those who live in an urban milieu direct their activities to their place of residence. They have a tendency to exclude anything taking place outdoors. In the minds of the people of Kilpisjärvi the place of residence extends to the out-of-doors. It is relatively easy for the people to step outside and even into somebody else's house to discuss, for instance, what is causing trouble in the snowmobile engine. The degree of privatization of everyday life has been relatively low. The life style deviates from the urban.

Although a residence in Kilpisjärvi is not the place where one retires in solitude as it is in urban communities, one urban feature, at least, has set in during the construction. In urban surroundings the residence serves as a gauge of accomplishments which distinguishes the social networks of

residential areas. In Kilpisjärvi it is obvious that in socially relatively homogenous areas neighborhood assistance is given up when it becomes feasible to build a house with anonymous outside assistance and individualistic efforts. Concurrently, social competition and withdrawal into a nuclear-family-centered and privatized life is brought about.

Although only a relatively brief period has elapsed since the beginning of the construction, changes in the values have occurred between different parts of the village. In different connections views have been expressed revealing that the village near the border was previously more highly valued than the area near the hotel. Today, the status of the less valued section has clearly improved. They have "come closer to these people formerly of the better end of the village".

Construction changes the physical features of a region. It improves the standard of housing. The features of the social life of the community also gain new characteristics. All in all, the effects tend to penetrate deep into the basis of life and to generate new factors. Perhaps a more basic matter is the relationship between construction and economy. So far, the effects of construction on the structure of economy have not emerged clearly. The expense structure of the families who have built houses has, however, changed somewhat since the proportion of savings has increased.

The events in the field of economy may have segmenting influences. In homogeneous communities polarization is often a reflection of the number of wage earners and of economic goals, direction of consumption, saving, etc. This polarization associated with many wage earners is reflected in many different elements of life. In addition, household chores and their distribution may change together with polarization. The local economy may redetermine the position of the sexes and generations. Kilpisjärvi seems to be relatively susceptible to such changes.

After the construction the economic freedom of action of the inhabitants has become narrower than earlier. On the other hand, freedom of social action has increased. The program of the experimental construction included a multi-purpose hall. Located there are the school, the library, the public health office and the gymnasium of the village and rooms for hobby circles. Leisure time activities have increased. At the same time people can have more roles than before the construction project. A postal clerk may be an instructor in a handicraft circle, a teacher may guide piano players, etc. Roles of leisure time are determined in a new way. Roles are determined by skills. This was common in ancient hunting and gathering communities. What happened in the multi-purpose hall increases equality and breaks down total features of the community. People say that the hall is a very important thing in their life.

What has been stated above means that, as a result of the construction, the households and the economy of the village will begin to generate side-effects. As a new process this would be conveyed to the social structure and life style. An experiment, apparently technical and concrete as such, may have profound social consequences. The phenomena revealed during the construction show that it is not merely a technical procedure or productive activity. In the north it is shaping life and may upset both the economic balance of the community and other bases of social life.

# **University of Alaska - Siberia Medical Research Program: Implications for Arctic Libraries**

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## Introduction

In November 1987, the University of Alaska Anchorage (UAA) and the Siberian Branch of the Soviet Academy of Medical Sciences signed a Memorandum of Understanding for scientific cooperation on the fundamental problems of adaptation to the North. The agreement is largely the work of one man, Dr. Ted Mala, a half-Russian, half-Eskimo physician on the faculty at UAA. He has persisted in this effort for more than five years and was lucky to be working for his dream at the same time General Secretary Gorbachev is in power.

## Background

The University of Alaska Anchorage: UAA is the designated health sciences campus for the University of Alaska. In addition, the University of Alaska Anchorage Library (UAA Library) collection supports the Alaska Health Sciences Library, a division of the state library that provides medical library services to the majority of the clinical personnel in the state. The University of Alaska is in the midst of a reorganization, caused by major budget cuts. There has been little money for the program, although the Alaska Legislature passed a bill to fund an Institute of Circumpolar Health, beginning in July 1988.

Siberian Branch of the Academy of Medical Sciences of the USSR: With 30 million people and several medical research institutions, there is little doubt that the Siberians have done considerable research in the field of arctic medicine. Little of it is available in the West. On the other hand, Soviet scientific literature is like our own: there is a lot written, not all of which is significant.

All Soviet research institutions have a problem obtaining Western literature. The problem is largely economic. Very little hard currency is available to research institutes for acquiring Western publications, even scientific literature! Most of what they get from the West is by exchange.

Clearly, the Siberians hope to obtain western medical literature through the exchange program with UAA. The key is to provide them with appropriate western literature, and to get relevant Soviet literature in exchange. Our problems are twofold: first, to obtain the Siberian arctic health literature; and second, to make it possible for researchers to decide if they want to translate the entire paper or report.

The Siberians know that the University of Alaska has no medical school, and is not exactly a national center for medical research. (On the other hand, they also know that the Soviet Academy is not apt to allow the Siberian Branch to sign an independent agreement with, say, Harvard Medical School!) I think the Siberians feel a kinship with Alaskans, not only because of the geographic proximity, but also because of the sense of removal from the center of the nation (or influence). As one of the Siberian officials pointed out to me, Soviet scientists usually attend international meetings, but they are usually from Moscow or Leningrad, not Novosibirsk or Khabarovsk!

The UAA-Siberian Medical Exchange Agreement: The agreement identified six areas for cooperative research:

1. to study the physiological aspects of adaptation to the North;
2. to study human nutrition and health in the North;
3. to study the effects of chronic stress in Natives and newcomers to northern regions under laboratory conditions;
4. to study the mechanisms of adaptive reactions of the immune system in northern conditions and specifically, the development of immunodeficient and autoimmune diseases;
5. to examine under experimental conditions the biochemical and genetic peculiarities of the effects of alcohol on metabolic processes in Alaskan and Siberian populations; and
6. to examine the training and preparation of Native peoples and medical specialists for service as medical personnel in the North.

The agreement further called for the regular exchange of scientific materials (the word used is "information" in the Russian version of the document)--and it is with this exchange that our arctic libraries should be involved.

#### Implications for Arctic Libraries

This agreement affords some interesting possibilities for us all as northern librarians. It opens up a body of information to which we have had very limited access and provides a means for acquiring Soviet

materials, specifically Siberian medical reports. This is an area of arctic information that has been relatively unavailable, partially, I suspect, because the materials are the Soviet version of gray literature.

The responsibility rests on UAA to make these materials widely available. We will need to encourage the researchers to share the translations that they have financed for their own projects, and to work out a way to track which materials are available in English.

And finally, my talks with the head of the external relations department of the Siberian branch suggests that the literature exchanged need not be limited to arctic health. However, we need to be very careful to prioritize what we would like to receive, or we could be overwhelmed with irrelevant literature.

#### Proposed Information Management Program

We have proposed a three-phase approach to managing the Siberian (and other) arctic medical literature.

First, the development of a joint bibliography in one of the six areas identified for cooperative research. We would conduct a thorough search of the English language medical literature, and the Siberians would do the same for the Russian language materials. Each would collect the materials identified and provide abstracts in their own language. The two bibliographies (and copies of the materials identified) would be exchanged, and each partner would translate the others bibliography and abstracts. The two bibliographies would be published simultaneously, perhaps as a single bilingual edition.

The key to this exchange is the abstracts. Good abstracts should make it easy for a researcher to decide whether the full article needs to be translated. While it is comparatively easy to find someone to write a good abstract, and also to have an abstract translated from Russian to English, finding someone to write a good abstract in English from a technical medical article written in Russian is nearly impossible.

As an added benefit, compiling such a bibliography should alert us to the particular sources for arctic medical literature. We suspect the subject literature, if published, is in widely scattered sources; but that most of the research result reports fall in the gray literature category. Bibliographies for the other five areas should be more easily compiled, if Glasnost and UAA finances allow.

The second phase in the proposed project is the development of a means to identify and track the arctic medical literature acquired in the exchange. This includes both the English materials acquired to provide to the Siberians and the Russian language materials received in exchange. (Keeping track of which of the Russian items are translated would also be highly desirable.) We anticipate the development of a bibliographic database.

The third phase would be the establishment of a long-range program for continuing the acquisition of arctic health materials at UAA, actually a by-product of the Siberian exchange program. Frankly, we do not know what volume of materials this involves. We believe that most arctic health literature is in the form of: (1) technical reports by or for government agencies involved in providing health care in the Arctic and (2) papers presented at conferences or submitted to a wide assortment of journals. There appear to be a limited number of monographs or specialized journals in the field. As many of us are aware from past experience, this type of literature is difficult to obtain, and once acquired is best managed with a bibliographic database.

### Discussion

We had expected to have some significant initiatives in a major medical literature exchange program to report on when we submitted our abstract for this paper. We don't. The initiatives are exactly where they were at the signing--ideas whose time is not yet come. We do not even know whether the proposed literature exchange program will be included in the yet to be established institute's budget.

Presuming that information collection and management are included in the program, we will be seeking the help of many of you in identifying sources and specific items. If you are aware of any "caches" of arctic health information, please let either of us know before you leave Boulder (or write to Barbara Sokolov).

Presuming we are involved in the program, we anticipate that some sort of bibliographic database will be utilized to control the literature. What form this takes and in connection with what existing database (MEDLINE, GNOSIS, a national arctic database) is unclear. Any comments you may have on this matter will be given consideration.

How can we handle the translation tracking problem? Remember we are dealing with mostly medical researchers, not librarians. How do we get them to contribute what they have paid to have translated? Any suggestions?

If Siberian arctic health literature becomes available or the proposed bibliography is produced, we shall let you know through the Northern Libraries Newsletter. Hopefully, at the next colloquy there will be something more substantial to report.

# **Let Them Read!: The Socio-Political Education of the Indigenous, Native Siberian Child - A Didactic and Dogmatic Approach to Reading**

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## Abstract

The image of the ideal Soviet citizen emerged as an ideological construct with revolutionary qualities and virtues as perceived by Lenin and the Communist Party. The "creation" of this citizen must indeed begin very early, if "new" children are to appear who incorporate the representative qualities of the ideal Soviet child.

The basic purpose of this presentation is to discover and clarify the salient features of such a child and to illustrate, through content analysis, how the various types of children's books are used to socialize and educate the native children of Siberia.

## Introduction

The Rasmuson Library has a unique and valuable special collection known as the Alaska and Polar Regions Collection. It focuses on materials dealing with Alaska, Canada north of 60 degrees, the northern provinces of Sweden, Norway, Greenland as well as the northern portions of the Soviet Union. Thus, an attempt is made to collect in all fields covering the circumpolar regions. In this context, this collection interest has generated an ongoing commitment to the acquisition of Siberian related materials.

The earlier assessment of the Siberia content monographs in polar collections of the Rasmuson Library of the University of Alaska Fairbanks, carried out by Lincoln and West (1986), identified language holdings, estimated collection strengths and weaknesses and evaluated the research potential of Rasmuson Library's "Siberiana."

That assessment stimulated a further interest in some of the indigenous small peoples of Siberia and their development. As a

result, in an analysis entitled: "The Unexplored Siberians: A Preliminary Overview of the Development of Indigenous Literatures and the Contributing Socio-cultural Factors," presented at the Eleventh Northern Libraries Colloquy, the author had an opportunity to explore some of the salient themes and patterns in the emerging belles-lettres of the Soviet Far North. While examining the creative development of some of the Koryak, Gilyak, Eveniki, Chukchi and Eskimo authors it became evident that the education and acculturation process of these writers had inevitably left a strong imprint on their aesthetic development. As a result of it, Soviet-Russification extended far beyond linguistic influences, enveloping their entire identities. Because of it, the indigenous writers, became first, and above all new, regenerated Soviet citizens. Within this process of reacculturation, and because many of the new cultural accretions in the arctic environment stemmed from Russian sources - an extremely curious blend of plots and characters emerged, cast in the mode of arctic Socialist Realism.

At what point of development does this process of creating a "proper new citizen" begin and what are the tools and methods used to chisel this image? The new Soviet citizen of the Arctic did not have any precursors to emulate, nor could he have socializing experiences in Soviet childhood or adolescence. The ideal Soviet citizen, after all, originated as an ideological construct, created by Lenin and the Communist Party. In the Soviet period then, reading materials for children in particular, faced the obligation of political and social conditioning in the hope of creating the new, ideal prototype. Lenin's recommendation that "the entire purpose of training, educating, and teaching the youth of today, wherever they exist in the Soviet Union, should be to imbue them with communist ethics" (Lenin, 1963, 5th ed. vol. 41, p. 309) was followed. Thus, educators and writers were called upon to find new forms of expression for the prescribed themes, depicting the idealized Soviet reality and experiences.

Naturally, numerous books created for children also utilized this bibliotherapeutic process of socialization. And, after a few generations, a composite image of an "ideal Soviet child" did indeed, emerge - as a forerunner to the "new Soviet citizen."

The basic purpose of this presentation then is to discover and clarify some of the methods used to imprint the imagination and character development of the emerging young citizen.

### Methodology

The appropriate resources found at the Elmer E. Rasmuson Library and the Alaska Native Language Center were utilized for this preliminary study. The primary method used was documentary content analysis of about 30 representative books in Soviet Siberian Yupik, published between 1932-1985 in the Soviet Union. Such educational tools as primers, readers and stories were used

in the process. A comparative approach was followed within the works being examined. Through the examination of factors such as: themes, ethics, morals, plot, characters and ideology, an attempt was made to gain an understanding of those formative ideas which help to fashion the desired citizen of the future.

While examining the available resources, it is helpful to remember that the publication and production of these books has always been most irregular and often accompanied by many difficulties. Between 1959 and 1973 for example, there was indeed, a very sharp decline in Siberian Eskimo books in general (Krauss, 1973, p. 15).

The situation may have improved in the 1980's however, due to the scarcity of information available. Exact statistics are difficult to obtain. By far, the major portion of the Soviet publication effort in the native languages of the small peoples of the Soviet North is devoted to socio-political-historical materials, and translations of standard Russian works.

Acquiring these materials in the West is often as problematic. Regardless of the existing exchange agreements established with the Soviet and Siberian libraries, these publications are often not obtainable. Due to multiple political and practical factors, such as paper shortage, for example, many of these materials are initially published in miniscule quantities. Thus, these works are rare even in the Soviet Union.

The combined resources on the Paleo-Asiatic languages in the Elmer E. Rasmuson Library and the Alaska Native Language Center provided the preliminary sampling of materials. Within this group of languages, the Soviet Siberian Yupik Eskimo books were well represented. From the sources available, the Soviet Siberian Yupik Eskimo offered the best representative sample of readers, primers and stories for examination.

The preliminary project could not have been carried out without the excellent translation of sources made by two students from Saint Lawrence Island: Darlene Orr and Brian Rokook. In addition, primers and readers examined included accompanying or parallel Russian texts.

### Sowing the seeds for development

Within each culture there are many ideals, tools, and methods employed in guiding the development of the young. Among the most commonly used tools in this process, are still, fortunately, books. From the earliest times, those concerned with education and social control have been aware of the power of books. In "The Republic," Plato wrote:

"Shall we allow our children to listen to any stories written by anyone, and to form opinions the opposite of these we think they should have

when they grow up? We certainly shall not. Then it seems that our first business is to supervise the production of stories, and choose only those we think suitable, and reject the rest." (Plato, 1973, p. 114-15.)

The importance of providing appropriate reading material for children has also been acknowledged in Russia for several centuries. Its educational and didactic role has been emphasized from the initial appearance of the seventeenth-century primer: Entertaining ABC's, by Karion Istomin, through the ideas of nineteenth century, to the precepts laid down by Maxim Gorky after the Revolution. Even the Tsarist censorship attempted to ascertain that the works published for the young were to instruct them in "correct attitudes to autocracy and Orthodoxy." (Nikitenko, 1975, p. 149.) The Soviet regime, then inherited some of its faith in the didactic, educative mission of children's literature.

Highly goal oriented societies have often followed Plato's dictum strongly, attributing not just a role, but the major role to children's literature and reading materials. But, as our theme is related to children's literature, or at least the preliminary analysis of representative samples of children's school books used in the contemporary Soviet Arctic, the reader will become aware that we are dealing with a society that is both explicit and systematic in its use of literature as a socio-political educational tool.

Russian language itself somewhat facilitates this process of socio-political education as it distinguishes between two types of education: obrazovanie and vospitanie. Loosely translated, the former embraces education, instruction, the latter: upbringing. In a Soviet context, the latter item also often encompasses moral and ethic training.

Following the Russian Revolution of 1917, Russian leaders turned their attention to problems involving helping the masses of their people become effective participants in a new culture. Intellectual and political leaders such as Trotsky, Gorky and Krupskaya greatly encouraged the civil-war torn government to support education by whatever means available. After all, at the time of the Revolution the majority of the people of Russia were illiterate.

### Educating the children of the Soviet Arctic

The situation was even worse in the North, as almost all the indigenous people of the Soviet Arctic were illiterate and were considered as being among the economically, politically and culturally most backward in the Soviet Union. Therefore, the Soviet regime introduced many measures simultaneously, in order to bring about the rapidly needed changes in the lives of the

people of the North. Efforts to wipe out "bespismennost" (absence of a written language) began soon after the onset of the Soviet regime. The reasons for this were initially educational as well as political, as the creation of a written language was an indispensable, a priori condition for the establishment of educational institutions, newspapers, and of course a written literature. Ultimately, a written language was essential for the dissemination of the ideas of communism itself. If the peoples of the North were to be able to be active participants in the new order, specialists from the ranks of the people themselves had to be trained to assume the leadership role in this process (Sergeev, 1955, p. 375).

In this milieu, rapid training of a cadre of local educators and managers, became the key to further cultural development. In this task, the Institute of the Peoples of the North, established in 1925, and later succeeded by the Herzen Teacher Training Institute in Leningrad as well as the Institute of Linguistics and the USSR Academy of Sciences, played a pivotal role (Bromley, 1977, p. 17).

The Peoples of the North Conference on Education and Literacy, held in Magadan in 1932, further charted other developments for the Soviet North. In that assembly of local leaders, educators and linguists, the Alphabet of the Peoples of the North was created, which was based on the Roman alphabet. Adopting a bilingual education policy for these regions at the time, necessitated the creation of the first school texts, readers and primers in the native languages. As Krauss has pointed out, the Soviet language policy of the period ascertained that all native groups had a right to be educated in their own language, recognizing the simple truth that children will learn far better and faster, if they are taught in their own language. Unfortunately, the more liberal linguistic policies were soon altered, and the Latin alphabet, adopted by all non-slavic tongues except Armenian, Gergpian, Yiddish and Abkhaz, was declared antiproletarian and abandoned in favor of the Cyrillic. This measure, of course, greatly facilitated the learning of Russian by the indigenous people, since only one alphabet had to be mastered.

### Teaching, literacy and textbooks

The schools in the Soviet Far North at first faced great difficulties. Parental resistance, misunderstandings and communication problems hampered progress. The children could not speak Russian, and the teachers could not speak local languages. There were no textbooks - and even the native written languages were not in existence. (Kuoljok, 1985, p. 60.) By 1933, the Komitet Severa adopted the bilingual education program, in which all the children in the North were to be instructed in their national languages during their first years in school, and were to study Russian as their second language. It's interesting to

note here, that as early as in 1926, a special syllabus for the schools of the North was issued, which stressed that "in the school work, references should be made to the local conditions". (Leonov, 1929, p. 211, Sergeev, 1955, p. 277, 274.) This emphasis is maintained even in the most current books and primers published today.

Carrying out the bilingual education policy has been more difficult, however. As Kuoljok attests (1985, p. 61), there have not been sufficient teachers or textbooks for some of the Soviet Northern ethnic groups. Large dialectical differences in some of the languages, have made it unrealistic to produce textbooks and teaching aids (Kuoljok, 1985, p. 62-63). An estimation made in 1948 - divided the schools of the Soviet Arctic into 4 basic groups:

- 1) Schools for people who possess written languages (Nentsy, Mansi, Nanays, Evens, Evenks, Chukchi and Eskimo) instruction is given in the national languages at the preparatory, and first and second classes. Later, instruction is given in Russian, and the native languages is taught as a subject.
- 2) Where great dialectical variations exist, such as among the Nivkhs, Selkrups, Khants and Koryaks - instruction is given in the native tongue only at the very preparatory level.
- 3) For ethnic groups, who have no written language - all instruction proceeds in Russian.
- 4) Schools with ethnically mixed populations - instruction is given in Russian, predominant native language is taught as a subject.

With the increased Russian populations in the Russian Arctic, schools with heavily mixed ethnic populations are becoming more common. In general, most children of the Soviet Arctic from the fifth class onwards use the general curricular materials adopted by Soviet schools.

Thus, only the Nentsy, Mansi, Nanays, Evenks, Evens, Chukchi and Eskimos were instructed in their native language from the mid-1930's on.

The decade of the 1930's then, in the Soviet North, represents a period of a major cultural revolution, as the educational systems were developed and written languages created - alongside collectivization and the establishment of national regions. As a result of these developments, an indigenous intelligentsia emerged in the Soviet North, infused with new values. Many of these intellectuals were engaged in multiple fronts of endeavors, working in collaboration with Russian educators and scholars.

## Purposive socialization through reading

Several individuals emerge from this process, who played a particularly pivotal role. The names of educators such as Katerina S. Sergeeva, Aleksandr Forshtein, Ekaterina Rubtsova, and Georgii Menovshchikov loom above all others. They were the heralders of literacy and the work they accomplished as teachers and linguists is remarkable. Through their efforts, the Soviet Eskimo children became literate and were drawn into the mainstream of the Soviet educative process and Soviet society in a gentle manner, enabling them to retain some ties with their own ethnic culture. We must also remember that while creating original texts, author's work often involved translating a large volume of materials from Russian sources as well. The incorporation of translated fables, folktales, proverbs, songs and poems became a standard practice.

Since we are examining some of the early childhood socialization processes achieved through books, the major focus will be placed on some of the school books used in the educative process. The first Eskimo primer "Bukvar" appeared in 1932, by Lugata and Bychkov. After a three year gap, another group of books appeared in about 1935-1936 (Krauss, 1973, p. 12) written by Amkagun Nengluvak. Within the 1937-1941 year period, some of the other acknowledged contributors were: Tayu, Tataaq, Qasega, Arkamaken, Achirgin and I.U. Kala. After the Second World War, most important work was done by G.I. Uyghapak, S.M. Gukhuge, Vera A. Anal'kvasak, L.I. Aynana and F. Kuyapa. (Ibid, p. 13.)

While the content and illustrations of these readers often assume an Eskimo facade, they are nevertheless clad into a rigid mold, imposed by the expectations of "socialist realism," as well as the uniform, standard curricular requirements set by the Soviet Ministry of Education. Indeed, all the features that we saw as being essential to a socialist realist novel, optimism, ideological content, positive heroes - are similarly requested in children's literature and readers. But in children's books, the didactic elements play an even greater role. (Kuoljok, 1985, p. 8.)

Whether we look at Soviet Siberian Yupik primers, or more advanced readers, the monographs examined seem like macrocosms of the standard Soviet readers. This is quite understandable because the reading program, must incorporate prescribed themes, with specifically allocated numbers of lessons devoted to each subject area. The prescribed themes include: the family, folk and moralistic tales, seasons, national holidays, descriptions of "our native land," eulogized national heroes - such as Lenin and whoever the other lucky ones may be. Other topics will cover work, collectivism, patriotism, internationalism, Octobrists and Pioneers. A reoccurring theme is the contrast of life, in its multiple aspects before the Revolution, to the "better life" achieved during the Soviet period. Each one of these themes

occurs to varying degrees in the books developed for the indigenous children of the Soviet North.

Since the primers and readers represent the first encounter of the children with the artificially ordered universe described in books, the introductory process is very important. Almost without exception, the stories, exercises, poems and illustrations draw the children into an ethnic environment they recognize. The child sees elements he understands: dogs, bears, reindeer, fish, and activities he can identify with. The illustrations may show children wearing Eskimo clothing, as they are seen in participating in traditional activities. Yet, modernization and a "new life" is appearing in these villages quite early. We see hospitals, tractors, helicopters, airplanes, electricity and the entire Soviet fleet is brought out to greet the reader! Almost from the very beginning the old ways are contrasted with the new.

In addition, nearly all primers and elementary readers start with the child's introduction to the new reality: school. Entering school is depicted as a joyous, important step. Throughout these books, the value of education is strongly underlined. The Eskimo children, though they may not always even look like Eskimo children, are depicted as well behaved and diligent - bringing flowers or spruce bouquets to teachers - on the first day of school, following the Russian custom. Very soon however, the children depicted will lose even more of their Eskimo characteristics, as they become more generic looking "Soviet children," wearing the red stars and kerchiefs of the Octobrists and Pioneers.

The scene changes rapidly, as the young readers are drawn deeper into the Soviet milieu and culture. Often, traditional elements depicted alternate with elements drawn from Soviet culture. The thematic break usually occurs somewhere around the second half of the book. Then, even the illustrated grammar exercises tend to underline the encroaching new reality. The reader can observe soldiers saluting, Lenin talking to children, tanks on a parade, rockets, astronauts, children helping out on a collective farm or, young Pioneers marching on May Day.

At a first glance, the child of the Soviet North depicted in books and literature appears to have the traditional qualities of "good children" worldwide. Such a child is seen as obedient, kind, industrious, and diligent. The only difference is in the degree to which these qualities are emphasized. Obedience is a highly treasured virtue. The Soviet child of the Arctic is expected to show obedience to authorities, be it father, teacher, or governmental authorities.

In addition to these qualities, the child is also taught through images the belief in collectivism, discipline, love of work, patriotism, proletarian internationalism and of course,

atheism. Since these concepts are very broad, their usage in primers and readers is manifold.

The virtue of collectivism frequently shines through the simplest animal tales. From the earliest stages on, the Soviet Eskimo child is conditioned to regard collective good above own selfish interests - whether it pertains to choosing leisure time activities or joining young Pioneers. The child's ethnic self-perception is also conditioned, so that the Eskimo child will begin to see himself not as an Eskimo, but as a "Soviet child," who will become the "new Soviet person."

Thus, Oasega Tataaq, Rubstseva, Gukhuge, Ainana and others have populated the pages of their works with images that fulfill that socio-political, educative mission. Reading through the primers and readers produced in the 1940's through 1981, we do indeed, see brigades of children helping on collective farms, just as we observe them helping elders and sharing what they have with others.

Above all, through these books, the child is gradually introduced to the concept of "Soviet Fatherland" or, Sovetski Rodina (Ainana, 1981, p. 135). Stories related to the fatherland are very important, because they ultimately tie into the central virtue of patriotism. The theme of fatherland is explored through multiple spectrums: naturalistic, geographic and patriotic. Much attention is paid to presenting nature, not simply as a source of passive enjoyment, but rather as a stimulus to action. Nature, at various times of the year, is used primarily as a background, especially in those stories designed to introduce the children to different types of activities and work. From the first primer examined to Ainana's collection of stories can observe nature surrounding the young berry and mushroom pickers, hunters, fishermen, kolkhoz workers or, the young Octobrists planting trees. So, the character-education process, initiated in these primers and readers starts very early. It meshes love, awareness and respect for nature with the love of work and the necessity for it.

Geography is skillfully interwoven into the central theme of the fatherland. Children are gradually moved from the environment and cities they recognize, such as Providenie (Ainana, 1981, p. 148), to the more distant cities and regions of Soviet Union. Throughout this journey, many contemporary themes and images have been added. Polar research stations, space exploration and rockets have appeared. Exploration of space and the technology associated with it have indeed, captured the imagination of the child of the Soviet Arctic. In the textbooks and primers it is used to reinforce the theme of patriotism. Space exploration, is not seen primarily as an achievement of science only -- it is depicted as the achievement of the fatherland. So, even a topic such as the cosmos and its heroes like Gagarin and Tereshkova, link together the reoccurring themes of fatherland, work and even Lenin.

The cities of the Soviet Union are depicted from the perspective of their national importance. Providentia is seen as a major Soviet Arctic port, not as an ethnic city. Moscow, Leningrad and, in the earlier primers Stalingrad are introduced both from a geographical as well as a historical - patriotic perspective.

The historical presentation focuses upon "heroic periods," the Revolution of 1917 and the Second World War. The all embracing element, enveloping fatherland is patriotism. Love of fatherland, i.e. the "Soviet Land," is the central chord that ties these stories together. Regional identity is not stressed, it is present, but the young reader is drawn into an identity with the Soviet Land and its people. This common land is above all to be worshipped and protected, through past remembrances, the revolution and the Second World War. Rubtseva, Ainana, Qasega and others tell us of heroic deeds. We see soldiers fighting Nazis, saving cities and children. Brave dogs carrying medical supplies, on the other hand, save soldiers in Kasyga's story Sanitaryn'ykaneg.

The Soviet military then is always seen in a very positive light, in which their function extends beyond protection. They are seen as leaders, helpers and guides. Their ennobling roles include helping during disasters and saving children from drowning during breakup, as in Ainana's (1981) Gykhtyl'yk. The lasting tribute to the Russian soldier is paid in Kassil'mun's story A monument to the Russian soldier - Pamiatniga Sovetskim Soldatyn'an (Leningrad, 1981).

The heroes of the fatherland emerge importantly, but they do not necessarily predominate in these texts. Just as the Russian saying states "that Lenin is always with you" - so is his presence made visible in every reader. His life is often cast in the traditional form of an old hagiography - (life of a saint), except that the extreme piousness of the former is replaced by more conventional, heroic virtues such as: honesty, industriousness, dedication, love, wisdom, and patriotism. He is portrayed in every conceivable form: as a leader, a teacher, worker, scholar, patriot, and friend. The other heroes depicted vary according to the political climate. Considering the publication dates of some of the books examined - many of them included Stalin and Kalinin as well. Who will appear next? Will Gorbachev's "Perestroika" reach the young arctic readers of the Soviet North?

The theme of patriotism is further very skillfully tied into the motif of children and peace. The country that is depicted for the children is essentially always shown as peace loving - but on guard. The theme of internationalism, as expressed in the works examined - supports patriotism by reapproaching it from the angle that proper patriotism is not Russian, or Chukchi, or Eskimo but Soviet.

## Conclusion

In many ways, the monographs examined can be viewed as representative samples of a whole spectrum of readers used in the Soviet Union. Ainana's Ankhak, published in 1981 indicates clearly that the basic formula for the content of primers and readers, adopted in the 1940's is indeed still utilized. While shedding some light on the customs, culture and environment in which the children of the Soviet North move - the books initiate the process of the creation of the new citizen. Through the utilization of prescribed norms, images are created which foster the development of the Soviet citizen of the future.

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\* List of readers and primers examined available on request.

# Library Services in Lapland

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Our discourse is about Lapland, which is the northern part of Finland, and especially, about the information services in Lapland.

There are about 200,000 inhabitants in Lapland. The capital of the county is Rovaniemi with a population of 30,000 inhabitants. There are 21 other municipalities in Lapland.

The Rovaniemi public library also has a duty to serve as a central regional library for the whole county. It means that other libraries can approach the Rovaniemi library when their own resources are insufficient. This includes interlibrary loans, searches on databases and consultation, and education on cataloguing, indexing and acquisition policy.

The specialty of the Rovaniemi public library is the Lapponica collection. It is a collection which consists of documents concerning the whole of northern Fennoscandia, which includes the northern parts of Finland, Sweden and Norway. Moreover, Svalbard, the Kola Peninsula in the Soviet Union, and Greenland, beginning in 1988, are represented in the collection. Naturally most of the collection is Finnish. The Lapponica collection, or the Lapland department, as it is also called, was started in 1961. At the moment it contains about 28,000 documents including monographs, magazines, maps, sound recordings, videotapes and microfilms.

In 1984, we began to record recent accessions on a data base. The documents are catalogued according to the AACR2 and classified and indexed according to the Finnish standards. This Lapponica database is, for the present, situated in the database of the Finnish state data center. Anyone, can access it via electronic nets, even here in the United States. It is open to anyone who purchases the user code.

In April of 1988 about one third of the collection was indexed in the Lapponica database. The index includes not only monographs, but also individual articles in papers, magazines and collective works. An estimated distribution of the languages in which the documents are written is:

- 56% Finnish
- 28% Swedish or Norwegian
- 9% Lappish
- 6% English
- 1% Russian and other languages.

When a document is a scientific report or a dissertation, it often has an English abstract, even though the text is written in Finnish or in some Scandinavian language.

This year the Lapland department started a project together with the Umeå Norway to gather all material in Lappish and about Lapps in a common database in Trondheim.

Another important library in Lapland is the Lapland University library. It concentrates on social sciences, legal science and education. Later in this discourse, you will hear more about the co-operation between the Rovaniemi public library and the Lapland University library.

In the 1980s, the management of our library has been interested in the duties of a public library. Its background is in the economy and the social development of the county. Because of various geographical and economic factors, Lapland is a border area and a developmental area, maybe even a periphery in Finland, and has economic problems such as unemployment, emigration and lack of education. In the 1980s the government began to take measures to solve the regional problems. One of its actions was a decision to give about \$5,000,000 yearly for various development projects. One of the projects was to provide more education for small business. This education includes everything needed in small business management. A part of this is knowledge of the information service net in the county and how to use it effectively with the help of the local library. The education of small business management was supervised by the Lapland University.

At the same time, the Rovaniemi public library initiated a project called Northern data service consisting of a series of studies. The purpose was to find out what firms need information, how to organize the information service and give information into the library net, which has connections basically all over the world.

Now that the first studies have been completed, we know a lot about the information needed in small business and are able to share the service with other organizations. According to these studies, the library has about 75 percent of the material needed in small firms. It is essential to emphasize this information through continuing education of both librarians and small business managers.

This attitude of regarding public library customers' information needs from their individual point of view, is new among librarians working in public libraries. Traditionally, public librarians want to serve the city inhabitants in general, without paying attention to special needs. However, customers do not use library services because of a general need for information, but because of an individual need.

Now you may ask what we have done to improve our services or what we are going to do? And also what things are interesting from the arctic libraries point of view? As we have already mentioned, information about library services is a part of educating small business managers. The most important step is to get an integrated library system. From the American point of view, it may sound that we are a bit late, because there are already several integrated systems in the United States. The Finnish large and medium sized

integrated systems in the United States. The Finnish large and medium sized public libraries will get their integrated library systems in the early 1990s. Then the Lapponica collection will completely be in our own database. The Lapland University library is a little ahead of the Rovaniemi public library; they will install their system this year.

The city of the Rovaniemi has another arctic institution, the Lapland Provincial Museum. In addition to this, the library and the museum, co-operating with Finnish Ministry of Education and the Lapland University, are planning to build an Arctic Center in Rovaniemi. The center will have an information department of its own. According to the present plans, the information service will have a small reference library, but mostly the department will use library files already existing all over the world via electronic nets. One of the databases that will be used is surely the Lapponica database in our library. The Arctic Center will also, through the information department, co-operate with the Finnish telecommunication company. The network that is going to be built by the Arctic Center will also be at our disposal and also yours here in North America.

# **The Use of Networks and Local Systems in Large Library Systems in the Pacific Northwest (Including Alaska)**

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## Abstract

During academic 1986-87, the author conducted a statistical analysis of the largest libraries in the Pacific Northwest and their use of the Western Library Network, one of three national bibliographic networks in the United States. This analysis was followed by on-site visits to each library to confirm statistical results and to investigate local system use.

This paper details local system use by these libraries. On-site visits to the libraries revealed large-scale use of local systems, with plans for even greater usage. However, making local systems work efficiently and effectively was judged to be very difficult for a variety of reasons.

## Introduction

The Western Library Network (WLN) is one three major networks or bibliographic utilities in the United States, the others being OCLC, Inc. and Research Libraries Group (RLIN). Of the three, WLN is the smallest both in client base and in size of data base.

It is a geographically-centered network, with its participating libraries being located, for the most part, in the Pacific Northwest. WLN also licenses its software to sites external to the Pacific Northwest, including such locations as the national libraries of Australia, New Zealand, China, Singapore, and the British Library. U.S. licensees include the University of Missouri and the University of Illinois Champaign-Urbana.

The network offers cataloging, catalog maintenance, and extensive searching ability with linked authority control. For further information on data base design and search keys, see Mandel, 1987.

It also offers an online acquisitions subsystem featuring fund accounting. It includes a state-of-the-art interlibrary loan subsystem which has been brought up within the last two years. Offline products include a CD-ROM catalog (LaserCat), computer output microform catalogs, cards, and various statistical reports appropriate to the subsystem used.

During academic 1986/87, the author spent approximately seven (7) months at the headquarters of the Western Library Network conducting research in several areas. This paper reports the partial and preliminary results of one of these research activities.

One area of great interest to both the author and the Network was the way in which larger library systems use network services and local integrated systems. Accordingly, a research design was formulated to measure both of these areas in very specific ways.

The objectives of this study were to:

1. Analyze and determine the use large libraries make of network services;
2. Determine what factors influence the degree to which large libraries make use of network services;
3. Determine which local integrated systems were in use or planned for use in these libraries;
4. Determine the degree of satisfaction that libraries expressed with their local system;
5. Assess which services might be moved from network use to local integrated system use.

This paper will deal only with the results from meeting research objectives no. 3, 4, and 5.

Network services were defined to be the services and products sold to individual client libraries by a separate organization which maintains online bibliographic databases, enabling it to offer computer-based support. The network provides a standard interface by which bibliographic records are available to libraries. A network requires the establishment of a central office and a staff to accomplish network programs (The ALA Glossary of Library and Information Science, 1983). The network used in this study was the Western Library Network.

A local integrated system was defined to be commercially available software and/or hardware or a locally designed

system which was intended for operation on customer-owned equipment. To qualify for inclusion in this study, the local integrated system had to be running on at least a mini-computer. Systems which ran on a microcomputer were not included. These systems had to support at least circulation activity and inquiry of the data base (Saffady, 1987).

Methodology

Because the study used the Western Library Network as the base, libraries to be investigated had to be members of this network. This precondition caused several large libraries to be left out of the study since not every large library in the Pacific Northwest is a member of WLN. Therefore, the term "large library" should be understood to be those libraries in the Pacific Northwest who utilize the Western Library Network as their primary bibliographic utility.

Determination of which libraries constituted the "large libraries" on WLN was governed by two factors: 1) size of collection as measured by number of holdings in the WLN base; and, 2) degree of use of network services. Using these criteria, table 1 lists the holdings of the largest 15 libraries in the network and their use of local systems.

TABLE 1. Largest Libraries in the Western Library Network  
6/30/86

<u>LIBRARY</u>	<u>LOCAL SYSTEM USED</u> (Y/N)	<u>NUMBER OF HOLDINGS</u> 6/30/86
Library #1	Y	559,543
Library #2	Y	427,010
Library #3	N	342,132
Library #4	Y	331,326
Library #5	Y	306,831
Library #6	Y	278,326
Library #7	Y	239,440
Library #8	N	229,704
Library #9	Y	225,684
Library #10	N	221,041
Library #11	N	186,187
Library #12	Y	168,260
Library #13	N	127,603
Library #14	Y	121,926
Library #15	Y	75,415

A detailed statistical analysis of each library was carried out using proprietary data supplied by WLN. Following this analysis, field interview forms were devised for the director of the library and for the library staff who used WLN and local systems on a daily basis.

Interviews were set up with the director (or his/her designated proxee) and library staff who were most directly responsible for managing network work flow and local system use. Interviews were conducted over the period of January through April of 1987.

The questionnaires were set up as a double-blind study to determine the process by which automation decisions were made in the libraries, how the use of the local system fit that process, and the degree of satisfaction/dissatisfaction there was with the local system in the meeting the needs of the library.

The interview sessions worked well to elicit the information sought for the purposes of this project. Staff at all levels tended to be very candid, both about their attitudes toward the use of networks and local systems and the problems in their individual libraries.

All directors of the libraries listed in Table 1 met with the author, with the exception of one library whose directorship was vacant. In that library, the author met with the designated proxee. The author met with at least one staff member in each library (and usually more than one) who worked with both WLN and the local system on a daily basis. Originally, an hour was allocated for each interview; several interviewees went over the hour.

### Research Results

With the exception of one library, every library studied either had a local system or was in the process of acquiring one within the next one to three years. Of those libraries which already had a local system, all (with the exception of two libraries) were having a very difficult time operating and maintaining the local system. As a result, large amounts of resources were going into keeping the local system operating rather than to other automation efforts.

The level of difficulty seemed unrelated to the system used; most of these libraries were using different vendors. The problems seemed unrelated to whether the local system was shared with another institution (which some were) or whether it was a single-institution system.

Libraries and local system vendors had consistently underestimated the level of difficulty and the amount of resources needed to make the system work. In some cases, the use of the system had far outstripped the original estimates, thus causing the system to not perform to the library's expectations.

One of the major problems in bringing up any local system is creating the data base. Initially all libraries used tape

loading to build their data bases. However, libraries found tape loading to be too slow, too out-of-date and too cumbersome to be the solution for maintaining the data base on a ongoing basis. This problem was exacerbated by the fact that each library had slightly different requirements for tape production by WLN--the range of which the network was not always able to provide.

The solution to the tape loading problem appears to have been the development of an online interface between the network and the local system. Before bringing up the local systems, libraries did not appear to have recognized the complexity of interfacing the local system with the network. Several libraries had developed interfaces which worked but were not working at the level wanted by the library. This problem had created heavier workloads in technical services, thus slowing general library processes.

Those libraries that were planning, .but had not yet purchased a local system were planning that an interface would be required in the bid document for the local system. However, several libraries who had had their interface developed by their vendor were not satisfied with it. Those who had had their interface developed by the network were only marginally more satisfied.

A factor that was becoming increasingly important to libraries whose system served multi-sites was the cost of telecommunications. In the United States, intra-state telecommunications costs are often higher than inter-state telecommunications costs. Several of these multi-site systems were experiencing difficulties with rising telecommunications costs or were anticipating that these costs would increase beyond their ability to budget additional funds. In these multi-site systems, much interest was expressed in a stand alone CD-ROM catalog that could be used by the sites instead of an online public access catalog (OPAC), thus eliminating the need for telecommunications lines.

Finally, as these libraries increasingly used their local systems, there was a pattern of using the network for fewer and fewer services. An example of this is computer output microform (COM) catalogs. Those libraries which had gotten their system to the point of using them for OPAC were no longer requesting COM production to the degree they previously had.

### Research Conclusions

One might be drawn to the conclusion from this research study that libraries would be well advised to not use local systems until they reach a higher technological level of sophistication. This is not necessarily the case.

Rather, the conclusion to be reached is that the implementation of a local system in a large library setting is very complex, requiring detailed strategic planning before the first machine is moved into the library. Overall, libraries underestimate, to a degree beyond measure, the difficulty and impact that bringing up such a system has upon the library's regular processes and staff. This conclusion is based upon several observations.

Earlier in this paper, the author noted that two of the libraries studied were not having substantial difficulties with their systems. Both of these libraries had had their system up and operating for at least four years or longer. This degree of satisfaction and degree of experience with the local system is not coincidental. There is a very long implementation curve to get local systems fully operational. Libraries generally do not plan for a 5-year or more implementation schedule for local systems.

Along with this lack of long-range planning, there was generally gross oversimplification in estimating the amount of resources needed for local system implementation. The resource most often neglected in estimating costs was personnel time, with many libraries failing to recognize that staff time was the most costly part of bring the system up.

Libraries and vendors both underestimated the complexity of the libraries' requirements. One library was not yet fully using the local system and already needed more computing resources.

The applications software from commercial vendors is still not as sophisticated as libraries want. One library director recognized this fact, as the director noted that libraries might buy and bring up several different local systems over time as software and library needs changed. However, this director's perspective was not a general one; many libraries believe that the purchase of a local system is an immutable decision.

There is a need for a standard that would govern the development of interfaces between local systems and networks. Many of the interfaces are screen dumps and require a record by record transaction for downloading. This is labor intensive and expensive.

Finally, local systems will continue to take over functions currently carried out by network utilities. For example, as better applications software is developed for library acquisitions, this is a function that will migrate to the local system. This, then, poses the question: what is the future role of networks in libraries? In order to prosper,

networks will need to develop new services to attract a market to their products. Perhaps an example of this is the custom CD-ROM catalog--a product now being offered by WLN.

The recommendation to libraries contemplating local systems implementation is then:

1. Strategic planning involving both administration, technical services, and public services staff is absolutely critical;
2. Implementing a local system should be envisioned as a multi-year project with constant evaluation of the process being built in as a feedback loop;
3. Realistic expectations of the system should be formulated with adequate resources allocated for implementation;
4. Patience and steady nerves are still virtues and never more so than when implementing a local system.

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# Electronic Mail and Library Cooperation

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## Abstract

*This paper deals with electronic mail systems and their role in the cooperation of libraries. An attempt is made to describe the commercial systems DIALMAIL and Omnet/ScienceNet and the non-commercial system USENET. These are only a few of the systems in use. Electronic mail can enhance the cooperation of libraries especially in the processing of interlibrary loans requests. In this connection telefax is mentioned as a quick medium of dispatching articles or reports between libraries.*

## Introduction

In his book "Innovation in electronic mail", Vervest defines electronic mail as "the electronic, one-directional transfer of information in the form of a message, via an intermediate (tele-) communication system, from an identified sending party to one or more identified receiving parties" (Vervest 1987) and Quarterman and Hoskins have defined a computer network as a "set of computers using common protocols to communicate over connecting transmission media" (Quarterman and Hoskins 1986).

At the beginning of this year (1988) it was estimated that about 7 million electronic mailboxes were in use. At that time public users were estimated to be 1.3 million and private users about 5.6 million. These figures are based on a prediction made in the beginning of last year. It is also predicted that the greatest growth in the computer industry will be in the areas of communications and networking.

The electronic mail systems may be divided into two groups, commercial systems and non-commercial ones. In the commercial systems group I will talk about DIALMAIL and Omnet/ScienceNet which is sometimes called Omnet or Telemail. Other systems in this group are ALANET, MCIMail, CLASS OnTyme along with many others. In the non-commercial group are the big university networks such as BITNET, ARPANET and USENET.

In an electronic mail system an individual is able to communicate in three different ways: He can send a message to another individual. This is called a one-to-one form of communication. He can send a message to a bulletin board which in most systems is a one-to-many form of communication and finally he can participate in a computer conference, which is a many-to-many form of communication. There are two types of electronic mail systems in use, systems based on a single computer which would

comply with Vervest's definition, and a network of computers that share the cost of transmitting the message to destination. The definition of Quarterman and Hoskins would fit that type.

### **The non-commercial networks**

Computer networks have been divided into five different types, research networks, company networks, cooperative networks, metanetworks, which are non-commercial and the fifth group is the commercial networks, which I will discuss later, but in this part I will discuss USENET, as that is the e-mail service I know best of the non-commercial research networks because the Marine Research Institute is the backbone, or primary site, of USENET in Iceland.

USENET began in 1980 and has grown rapidly since then from about 50 sites in the end of the first year to about 6.500 sites at the end of last year. It carries over 280 conferences or news groups and is the biggest decentralized network in operation. From USENET you are able to send messages to ARPANET and BITNET in the United States, to EUNET and EARN in Europe, as well as to local networks in Korea, Japan, Australia and New Zealand. You are also able to send messages to most of the local university networks throughout the world. USENET is a true network of computers. You do not send your message to a central computer where the person you are addressing will hook up to. You actually send it to the person's computer or place of work. The message jumps between computers until it reaches the one it is addressed to. My address on USENET is `eirikur@hafro.is` where `eirikur` is my name, `hafro` is the name of my Institute's computer, my place of work, and `is` is the domain name for Iceland as every country is a domain. Everyone must have a definite address just like in the ordinary mail. The list of computers which is used in order to transmit a message from person to person is called a path. The path to me is built up by various computer names, and is dependent on from where the message is sent. This is an example of a path from me to someone in California: `eirikur!hafro!mcvax!uunet!lll-winken!lll-lcc!ames!pasteur!ucbvax!ucdavis!ccjoan`. This works exactly like the ordinary mail, which goes from one post office to another until it reaches the final destination, except that the computer messages are much faster. From USENET you are able to send messages to some of the commercial e-mail services, like Omnet/ScienceNet.

There is no official list of users available for Usenet except online but it is too big to print. You can just check if some site is on the network, get the address if available and send the message, or you can ask the net through some newsgroups if they know the address of the person you are looking for.

### **Commercial networks**

Commercial electronic mail networks are usually centralized. You have to get an account on the chosen system to be able to use it. These systems are based on a central computer to which you send your message. You and the person you are sending the message to must have an account or mailbox on the same computer to be able to receive the message. An example of a commercial system is DIALMAIL.

DIALMAIL is a part of the DIALOG Information Service and was established primarily to provide DIALOG users with a cheap method of downloading prints from online searches and a medium for communication between DIALOG users. DIALMAIL is in the process of being revised and the new version is expected to be in use late next month (July). Some of the features in the new version are that you can stop output with a BREAK, access DIALMAIL from DIALOG and the capability of accessing a specific message or range of messages by message number. DIALMAIL has no telex or TWX possibilities. Furthermore it is not possible to communicate with other systems from

DIALMAIL or to upload files, as the system does not support file transfer protocols but both these features are on the wishlist for future versions.

A bulletin board was started on DIALMAIL because of this colloquy and in fact I first became aware of it there. Since then most of my correspondence with the colloquy's arrangers has been through DIALMAIL. On DIALMAIL you are able to correspond with an individual and a bulletin board. You can also join a conference and take part in the ongoing discussion. I have found it a drawback that there is not a bulletin board for general notes or announcements. As a consequence there are f.ex. some conferences or bulletin boards on the system with only one message where people are looking for someone. Such messages could go on a general bulletin board if it was there, and automatically deleted in say 10 days.

DIALMAIL is very cheap. There is no setup fee and the cost is only \$12.00/hour plus the additional cost of storing messages on the system.

Omnet/ScienceNet is the second commercial electronic mail system we use at the Marine Research Institute in Reykjavik. It is run by a small firm in Boston, Mass., Omnet, and is mostly devoted to the earth science community, including oceanography and polar research. It is the only e-mail service that has a mailbox in Antarctica and there are several mailboxes on board ships. Omnet/ScienceNet started in 1980 and has been growing very fast since then. There are about 1800 mailboxes on the system with at least 20 added each month. There is a setup fee for the first mailbox of an account, but much less for additional mailboxes. There is also a fee per character unit received or transmitted in addition to connect time charges. We frequently send and receive messages, including telex and TWX messages. The system supports file transfer protocols, which means that you can upload files to the system and thus save connect time and you are able to send and receive messages from other systems.

Unlike DIALMAIL you have only choice of sending and receiving messages from individuals and check bulletin boards. There is no conferencing facility on the system. Omnet/ScienceNet has bulletin boards for general announcements which everyone is prompted for as he enters the system. The bulletin boards are a mixture of the bulletin board and conference facilities on DIALMAIL. You are able to connect to external databases specialized in the field of earth sciences. Furthermore you can send a message to other e-mail services. This may be done f.ex. for all TELEMAIL mailboxes, Envoy-100 in Canada, USENET, Arpanet and BITNET worldwide. If this is the only feature used, you will miss a vital part of the electronic mail service. That is the bulletin boards and conferences along with the mailing lists. You can not access these unless you are a subscriber to the service.

#### **Use of electronic mail**

When the user wants to sign up with a commercial electronic mail vendor, he must acquire a password to the system and have a user area (mailbox) set up. He pays a one time setup fee, and after that he pays as he goes. That includes the connect time and a fee for every character unit he receives or transmits. The fee is usually not very high, but it varies by vendors. After he has signed up on the system he can send and receive electronic messages, access bulletin boards and conferences where available, and in some cases he can send and receive telex and TWX messages.

The use of electronic mail for interlibrary loan requests depends on that everybody is using compatible system. In the oceanographic and earth sciences Omnet/ScienceNet is the main e-mail vendor. The International Association of Marine Science Libraries and Information Centers

(IAMSLIC) has a bulletin board on Omnet/ScienceNet which is sometimes used to send requests for articles or books which are not to be found in any union catalogs. According to a survey carried out in relation to the IAMSLIC meeting in Halifax in October 1987 (Marshall 1987), there are about 20 libraries subscribing to Omnet/ScienceNet, but hopefully there will be an increasing need for libraries in this field subscribing to Omnet/ScienceNet in the future. According to the survey 21 libraries indicated that they could access DIALMAIL, but very likely many more libraries use DIALOG. Therefore they could easily obtain access to DIALMAIL. Out of a total membership of about 180, 46 replies indicated that they had access to electronic mail. According to a survey carried out prior to this meeting 24 replies indicated that they had access to DIALMAIL, BITNET or ENVOY-100, and 10 use other systems.

I use DIALMAIL when I am searching DIALOG databases for downloading of search results. If I do the search early in the morning I am able to download the results from DIALMAIL later the same day because of time difference. As you know DIALOG is running the DIALORDER service which you use for ordering documents while you are still searching.

As stated before there are many libraries subscribing to DIALMAIL, and many more could undoubtedly do so simply because they have an account with DIALOG. DIALMAIL has an online form for interlibrary loan requests. The request looks like this when you receive it:

**To:** *Eiríkur T. Einarsson*

**Subject:** *book loan*

#### **INTERLIBRARY LOAN FORM**

**Requesting Inst:** *Marine Research Institute*

**Library:** *Librarian*

**Address:** *P.O. Box 1390*

**City/State/Zip:** *121 Reykjavik, Iceland*

**Lending Lib code:** *Hbs*

**Borrowing Lib code:** *Haf*

**Request No:** *1*

**Date:** *010987*

**For use of:** *V. Helgason*

**Status:** *Fish. biol.*

**Need Before:** *011187*

**Max Cost:** *1000.- kr. isl.*

**Book author:** OR *periodical title, vol/issue/date.*

*Jonsson, G.*

**Book title, edition, place, year, series:** OR *periodical author, title, pages.*

*Islenskir fiskar. Rv. Fjolvi, 1985. (Nattura Islands).*

**Verified in:** OR *item cited in*

**ISBN or ISSN:** *Not applicable.*

**OCLC acc no:** *Not applicable.*

LC call no: *Not applicable.*      RLN acc no: *Not applicable.*  
DIALOG File no: *Not applicable.*      DIALOG acc no: *Not applicable.*  
Copyright Compliance (CCG/CCL): *Not applicable.*

Authorized by: *E.T. Einarsson*  
Title: *librarian*

**Comments**

*Bold face: Prompted by the system*

*Italics: Input by user*

Omnet/ScienceNet is also willing to provide an interlibrary loan form online and has in fact created a preliminary one for IAMSLIC, which looks like this:

**IAMSLIC INTERLIBRARY LOAN REQUEST**

10 To: *SCRIPPS.LIBRARY*      No need after: *12/21/87*      Order # *WE45689*  
20 Call #: *PG1245*      For: *John Scott*      Status: *Prof*  
30  
40 *Samantha Smith*  
50 *Algae and Other Slimy Green Things*  
60 *2nd ed., London 1983*  
70  
80 Ver/Cited: *234356555 ISBN*  
90  
100 **If non-circulating, supply MICROFILM if cost does not exceed \$35.00**  
110  
120 **THIS EDITION ONLY**  
130  
140 **Authorized by:** *Candice Bourbon*      **Complies w/ 108(g)(2) CCG**  
150  
160      *University of Iowa*  
170      *School of Oceanography*  
180      *Sandy Shores, IA 45167*

Personally I prefer using Omnet/ScienceNet as it offers a broader range of service and it is also more into my Institute's field of work than DIALMAIL. Another reason is that growing number of libraries in my field of work are subscribers of Omnet/ScienceNet and the third reason is the interconnecting capability which makes it easy to send messages to other networks. There is a reason for Northern librarians to use Omnet/ScienceNet and that is the fact that much of the Polar research is in the fields of science and technology. There are a number of polar scientists on the system and a special bulletin board for polar research. It is a great advantage for librarians to use the same electronic mail system as the people working in the field.

Recently the electronic mail - fax connection has become available on Omnet/ScienceNet. That gives you the opportunity to send computer files through an electronic mailbox to a fax machine. The fax is increasingly being used in libraries throughout the world for interlibrary loans. The British Library is announcing what they call "Urgent Action Service" giving you immediate access to the libraries resources, which means that you could have the needed material in your hands within hours.

## **Conclusions**

How is the research library of the future going to function?

I think that the computer system will be the most important part of it. It will be used for online searches, the results are downloaded and sent by electronic mail to the scientist who asked for it. The scientist selects a few references and sends them back to the library by electronic mail with a note about that he needs the articles yesterday - isn't that typical?

The librarian locates the periodicals in various libraries ranging from local to overseas ones. The librarian sends requests for photocopies by electronic mail and telefax and asks for the photocopies to be sent as soon as possible by fax. The next day the library's telefax machine is busy most of the day printing copies of the articles requested.

If the library is going to function this way, we need a directory, updated as frequently as possible, which includes the electronic mail addresses and telefax numbers of the institutes in our field of interest. We also need a union catalog of periodicals, to be able to use each others resources. By using electronic mail to send the requests and fax to transmit the articles we could make the service of our libraries quick and effective. Of course there are many problems we will face before this becomes a reality, but the problems are for solving them!

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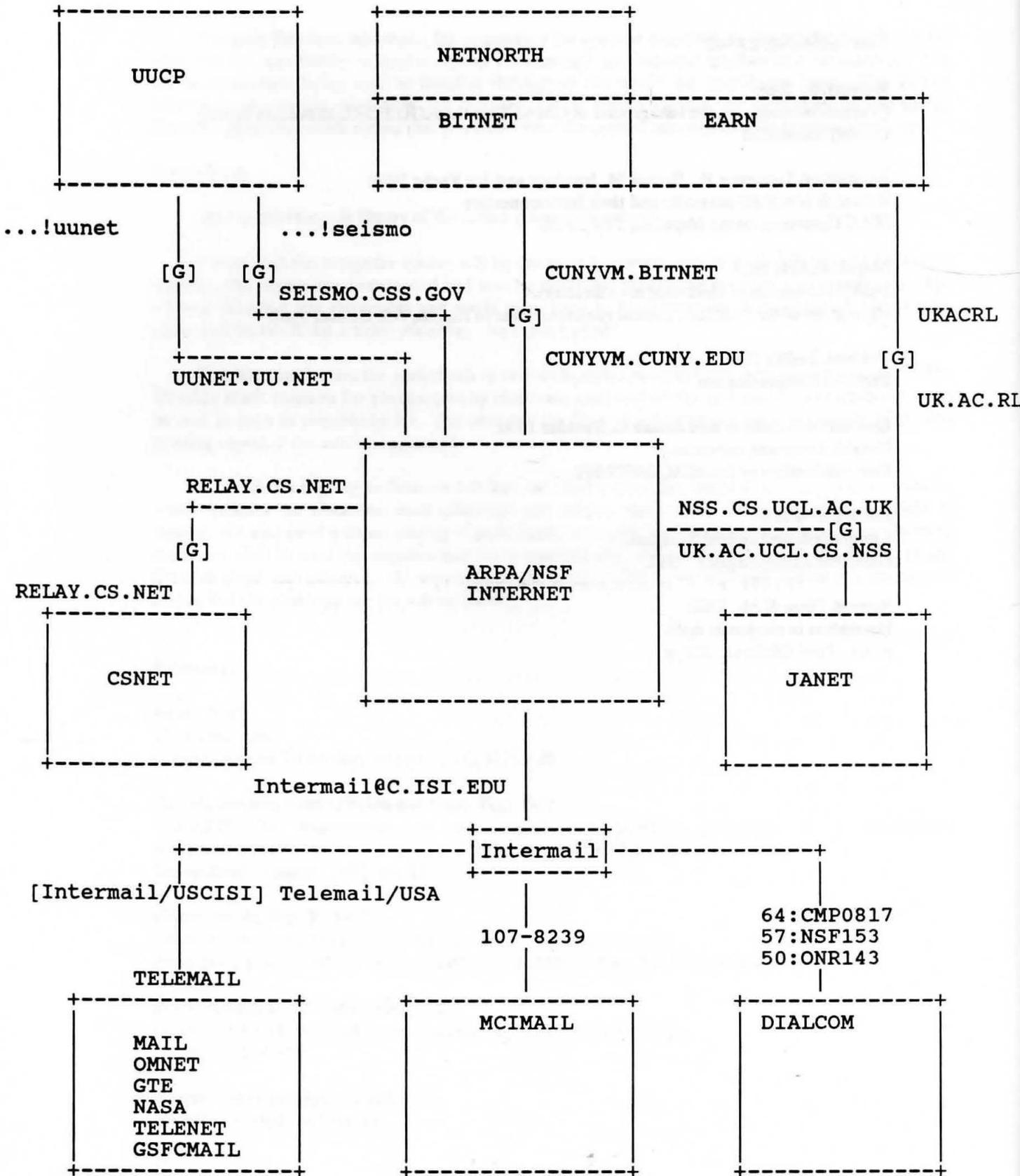
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NETWORK CONNECTIONS



# Planning an Information Centre on Cold Region Technology

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This paper deals with the planning of an information centre on cold region technology at Luleå University, Sweden. Since its establishment in 1971 the University has engaged in research on cold region technology. Research areas have included ice-mechanics, studies on permafrost, hydraulic systems in low temperatures and engineering maintenance work in cold climates.

To intensify this research a joint programme, COLDTECH, linking University and industry has been set up. At the Northern Libraries Colloquy in Luleå in 1986, Roger Lindmark presented a detailed outline of the COLDTECH-programme. A result of the programme is that Luleå University together with ABV, a large Swedish construction company, is building the Swedish Antarctic Research Station.

For COLDTECH the question of information is also an important part of its agenda. During the Spring of 1987 Luleå University and COLDTECH assumed responsibility from the Swedish Society for Collaboration on Terrain-Vehicle Research for the development of some kind of organization dealing with information exchange and cooperation in "winter research". For the continuation of work, arrangements were made between COLDTECH and Luleå University Library and it was at this point that the notion of an information centre on cold region technology started to crystalize.

The willingness of the library to participate in the establishment of an information centre is clearly due to its long-term commitment to the facilitation of information exchange on technology in cold climates. This being of greater importance when it is related to the newly formed consortium or national network linking the six major resource libraries in Science and Technology in Sweden.

So far activity has mainly centred on the gathering of information like surveys of reference works, scientific journals, etc., dealing with cold climates and the making of visits to established institutions such as the Scott Polar Research Institute, the Danish Arctic Institute and the Nordic Council for Arctic Medical Research (NOSAMF). These visits have led to valuable discussions and the generation of ideas.

In connection with the "planning side of things" contacts were made with NORDICOM (Nordic documentation center for mass communication research), which

in recent years, many in Sweden have referred to as an example of how to proceed in the formation of this kind of organization. NORDICOM have two major tasks - an information function and a documentation function, tasks which form the basis for all types of information services.

At NOSAMF information and documentation are recognized functions but emphasis is given to the task of being a contact centre and coordinator of research.

Both these organizations are Scandinavian and such an international perspective is desirable for a future information centre in Luleå. Representatives from NOSAMF were eager to make this point at a seminar held in Luleå in April this year where some initial guidelines for the new centre were discussed.

After all preliminary discussions it was agreed that what is required is the allocation of resources to enable us to realize the following course of action: A limited project-organization of 2-3 people should be established with close links to an additional reference group designed to implicate certain key individuals (researchers, industrialists, librarians, etc.). At a preliminary meeting the project group should, together with the reference group, set out a strategy to guide future work.

Representatives from NORDICOM maintain that it is necessary to begin in an outward-looking and consumer (user)-oriented fashion as it is useful to be able to make an appearance at a large gathering of researchers with some kind of commodity to offer. In June 1989 Luleå University will host an international conference on Port and Ocean Engineering under Arctic Conditions, POAC'89. This will be the 10th POAC conference and it can be seen as a unique opportunity to make contact with researchers (as well as industry) from all over the world. Conceivable products for the conference include: A COLDTECH-directory - containing an index of libraries and institutions with collections of interest as well as a list of relevant periodicals; A COLDTECH-research register - containing details of ongoing research in Sweden, in particular, and hopefully, Scandinavia in general. In addition a minor exhibition at the conference would be beneficial covering literature, bibliographic aids and online services as well as information on organizations and networks.

On a routine everyday basis the information centre should start off as a useful meeting place for researchers working in a multi-disciplinary context. This is a "natural" role for the centre to assume as a need for a more formal organization clearly exists. A suitable arrangement for researchers within COLDTECH's domain could be a presentation of new literature and aids for information searching. During subsequent meetings research projects could be presented. This would supplement the knowledge base of the centre.

This will begin internally and at a suitable time go outside Luleå University and at such a time, the natural way to keep in contact and also to spread information would be through a newsletter. Making use of electronic mail should also be considered.

The setting up of an information centre on cold region technology can be seen as part of the idea to create a Scandinavian network which could be a link in the global connection of Polar information.

# **The Merger of the Boreal and ASTIS Databases: Genesis of a Canadian Polar Information System**

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## Abstract

Canada's two major publicly-accessible arctic bibliographic databases are BOREAL, the catalogue of the Boreal Institute for Northern Studies Library, and ASTIS, produced by the Arctic Science and Technology Information System at the Arctic Institute of North America. This paper describes a plan for merging these two databases to form a single coherent information system with one online database and a single set of hardcopy products. We begin by discussing the options for increased bibliographic cooperation between the two institutes, and explain why a merger of the two databases is the preferred option. We then discuss the merger plan in some detail, including the scope and management of the merged database, the required products, and the manpower requirements and cost of the merger. Finally, we discuss the enhancements that would be required to develop a national Canadian Polar Information System using the BOREAL/ASTIS database as a core.

## Introduction

The BOREAL database is the catalogue of the Boreal Institute for Northern Studies (Boreal) Library. The ASTIS database is produced by the Arctic Science and Technology Information System at the Arctic Institute of North America (AINA). Both are multidisciplinary arctic databases, and both are produced using the SPIRES database management system on a computer located at the University of Alberta. BOREAL has been in operation for eleven years, and ASTIS for ten. As of June 1988, BOREAL contains approximately 38,000 records and ASTIS approximately 27,000. The overlap between the two databases is estimated to be 6000 records. This relatively low overlap means that there has not been a large duplication of effort between the two databases, but also suggests that both databases are far from comprehensive.

While there are similarities between the two databases, there are also significant differences. BOREAL was designed as a library catalogue and ASTIS as an abstracting and indexing service, and the structure and products of the two databases reflect this difference. The record formats and indexing/cataloguing practices differ in many respects. While both databases provide online searching and a current awareness bulletin, only BOREAL provides the products required for library operations and only ASTIS provides a cumulative bibliography and typeset special bibliographies. BOREAL has enjoyed continuity of mandate and funding

over the years. As a primarily externally-funded AINA project, ASTIS has had periodic redirections of focus within its overall arctic mandate, as well as significant fluctuations in funding.

All records in BOREAL are bibliographic, while in ASTIS 24% of the records are descriptions of research projects. BOREAL records contain short annotations, while most ASTIS records contain full abstracts. Subject and geographic indexing in BOREAL is done using numeric Universal Decimal Classification codes; in ASTIS terms from the ASTIS subject and geographic thesauri are used. 45% of the records in BOREAL are about Canada, versus 67% in ASTIS. 60% of the material in BOREAL was published in 1978 or later, versus 78% in ASTIS. BOREAL is publicly available only in Canada on the National Research Council's CAN/OLE online retrieval system. ASTIS is publicly available worldwide from QL Systems Ltd. Nearly every item cited in BOREAL is available in the Boreal Library. ASTIS bibliographic records contain location codes for libraries holding the document: 87% are available at the University of Calgary Libraries (and possibly have other location codes as well), 9% are available at other Canadian libraries, and 4% have no location code.

Because of the similar geographic scopes of the two databases, and because Boreal and AINA are neighbours, the possibility of closer cooperation between BOREAL and ASTIS has been discussed many times over the years. The two databases have cooperated by referring customers to each other and by conducting some joint marketing programs, but their differing objectives and funding environments have worked against any operational linkages. Two past attempts at cooperation are worth mentioning here.

Between 1979 and 1981 the Boreal Library and ASTIS, along with four other Canadian northern information centres, invested a considerable amount of effort in planning for a cooperative information network to be called the Bibliography of Northern Canada (BNC). As part of this effort a detailed comparison of the BOREAL and ASTIS record formats was made. Although funding to begin building BNC was never obtained, the exercise did result in a much better understanding of the differences and similarities between BOREAL and ASTIS.

In late 1986 the Boreal Library and ASTIS began looking for a way to further reduce the overlap between the two databases. At first these discussions centred on a possible division of the Canadian arctic literature by subject or by geographic area. Because such a division would have implications for the mandates of the two institutes, agreement could not be reached. Neither institute wanted to restrict itself to only certain subjects or only part of the Canadian Arctic. The impasse was resolved when Dr. Sheila Bertram, Dean of the Faculty of Library Science, University of Alberta, suggested a division of responsibility based on the form of materials. An agreement was soon concluded under which, in broad terms, BOREAL would cover monographic materials and ASTIS would cover analytics. Unfortunately this agreement was only in the early stages of implementation when it was crippled by the dependence of ASTIS on external funding. A sharp drop in ASTIS's traditional petroleum industry funding, coupled with pressure on AINA's core budget, required ASTIS to rely almost entirely on short-term bibliographic contracts for support. While working on such contracts ASTIS must enter many monographs into its database, and has resources to do only a minimal number of analytics. Although temporarily in abeyance, this agreement to divide the literature by form will be implemented when funding allows, and plays a key role in plans for a merger of the BOREAL and ASTIS databases.

## Options for Database Cooperation

In 1987 the Boreal Library and ASTIS were given a mandate by the management of their institutes to examine the possibility of combining the BOREAL and ASTIS databases. This initiative was motivated by the improved service that such a merger could provide to users of northern information, by an expectation of continued pressure on the financial resources of both institutes, by a desire for increased cooperation between the two institutes, and by the criticism in the report Canada and Polar Science of the fragmented nature of polar information systems in Canada.

In June 1987, Robin Minion received a grant to examine various options for database cooperation between the two institutes. This work was done in the summer and fall of 1987 in cooperation with Ross Goodwin, and culminated in a detailed report which was submitted to the management of both institutes. A list was prepared of 7 possible options for cooperation. These are:

1. Pre-1987 state - no cooperation other than limited joint marketing.

### Advantages:

- each institute pursues its own mandate and is free to expand, contract, or re-direct its efforts as it wishes.

### Disadvantages:

- users are presented with two different sets of overlapping and non-comprehensive products.
- there is duplication of effort in indexing/cataloguing, production of products, and systems development and maintenance.
- the two institutes are foregoing opportunities to make coordinated approaches to funding agencies.

2. Present state - separate databases and separate products, but a reduction in overlap between the databases based on a division of material by form. Both databases eventually available from the same vendor.

### Advantages:

- users see less overlap and better overall coverage than under Option 1.
- much duplication in indexing/cataloguing is eliminated.
- does not require any significant changes to systems and procedures, nor to existing records, so no monetary cost.

### Disadvantages:

- users still must use two different sets of products, and the combined coverage, even of just the Canadian Arctic, is still far from comprehensive.
- neither database is able to produce comprehensive special bibliographies without manually copying many of the necessary records from the other database. Besides being inefficient, this copying increases user frustration by increasing overlap.
- continued duplication of effort in production of products and in systems

development and maintenance.

- does not significantly increase opportunities for funding since there are still two separate systems, with all the disadvantages for users which that creates.

3. Allow database vendors to merge the databases online, but maintain separate production versions and separate hardcopy products. (It is not known whether this alternative is possible. So far, vendors have indicated that they would prefer Option 7, where we merge the databases.)

Advantages:

- same as Option 2, plus users only have to search a single database.
- cheaper than Option 7.

Disadvantages:

- same as Option 2, except there is a single online product.
- lower quality merge than with Option 7. Records from the two different production databases have somewhat different formats in the merged database. Some records in the merged database have UDC subject/geographic indexing and some have ASTIS subject/geographic indexing, so there is no single system of subject/geographic access that applies to all records. The program for eliminating duplicate records does not catch all duplicates, and discards some records that are not duplicates.
- vendors expect payment, or reduced royalties, for doing the merging.
- if the database is up on more than one vendor, as planned, then each vendor must do its own merging - a duplication of effort.

4. Separate databases and separate products, but exchange records in machine readable form.

Advantages:

- reduces duplication in indexing/cataloguing, therefore freeing resources to improve comprehensiveness.
- does not require major changes to existing systems, although new software to facilitate the exchange is necessary.
- allows each Library/Institute to produce and market products which can be identified with that Library/Institute and therefore enhance its visibility.

Disadvantages:

- users still must use two different sets of products. They still have to search two databases, but now find an increased number of duplicate records in their two searches. They will have to pay twice for these records, and go to the trouble of weeding them out of their search results.
- does not significantly increase opportunities for funding because of the disadvantages for users.
- continued duplication of effort in production of products and in systems development and maintenance.
- some manual effort required to reformat the records being exchanged. Less work than original indexing, but more work than in Option 7 where no

reformatting is necessary.

- since the two databases have very similar mandates, almost all records are exchanged. (The main exception would be ASTIS's research project descriptions.) The two institutes are therefore paying to store and maintain two copies of what is really the same database. Exchange of records only makes sense for databases with low to medium amounts of overlap in their mandates. (This may be true for cooperation at the international level, for example.) If the overlap in mandates is large then it will always be more efficient to work together on a single database.

5. Convert one database to the other's format.

Advantages:

- requires less new programming of output formats than Option 7.

Disadvantages:

- does not correct the problems of the existing databases. ASTIS and BOREAL are 10 and 11 years old respectively. Software and hardware capabilities have improved greatly during that time, the needs and expectations of clients have changed, and both institutes have learned a great deal more about what they want from a database. Both databases have deficiencies which could be corrected with a new design.

- there may be more work (both manual reindexing and programming) required to convert all the records of one database to the other's format, than is required to convert both databases to the best possible common format as in Option 7.

- still requires significant software changes since neither database can produce all the required products.

6. Define a common format for a merged database but use only for new records.

Advantages:

- no cost for converting older records.

Disadvantages:

- all the work done over the last eleven years is abandoned.

- the Boreal Library catalogue is two separate databases.

7. Define a new format and convert all existing records to produce a single joint database. Design of the new format is based on user needs, ease of conversion from existing ASTIS and BOREAL formats, and compatibility with other databases. Each institute is to be responsible for adding and updating certain records, divided on the basis of form, within the merged database. Production of external products and systems development and maintenance are conducted jointly, and costs and revenues are shared.

Advantages:

- users have a single source of arctic information, with one coordinated

set of products and no duplicate records.

- the efficiencies realized in production, development, and maintenance can be devoted to additional indexing/cataloguing, thus allowing the database to be as comprehensive as financial resources allow.
- encourages rationalization of the two institutes' library collections.
- provides a Canadian point of contact for international networking of polar bibliographic information.
- the two institutes are seen by our universities, provincial government and federal government to be cooperating closely.
- a single information system allows the two institutes to approach funding agencies for the resources necessary to make the database truly comprehensive. A joint AINA/Boreal database may present the only hope for obtaining the level and security of funding necessary to develop a comprehensive Canadian polar information system.

#### Disadvantages:

- the most expensive alternative to implement, although once the databases are merged operating costs will be no higher than with separate databases. While some of the cost can be covered by the diversion of existing resources, significant new outside funding must be assured before the database merger can begin.

Based on the advantages and disadvantages of each option it was decided to recommend to the boards of both institutes that Option 7 be pursued, provided funding from outside sources could be obtained. Failing that, Option 3 was recommended. Both boards approved the recommendations.

#### Details of the Preferred Option: A Merger of the BOREAL and ASTIS Databases

A plan for merging the two databases was produced in sufficient detail to: 1) demonstrate that such a merger was possible; that is that the two institutes could agree on a database structure and a set of products that would meet the needs of both their client groups, and 2) obtain a general estimate of the cost of the merger.

The merged database would remain multidisciplinary. It would emphasize but not be restricted to the Canadian Arctic, and it would emphasize current material although historical material would be included. The merger and the resulting combined database would be jointly managed by the Arctic Institute of North America and the Boreal Institute for Northern Studies.

A literature review was conducted as the first step towards devising a plan for the merged database. While information relating to the establishment of joint databases could be found, little has been written on the merger of existing databases.

An examination of a local cooperative database project yielded the same problem. The cooperative project was initiated before any libraries had established online databases. The libraries involved did not have to deal with the problem of merging existing records and record structures.

Existing standards, such as MARC and Unisist, were also considered and the structures of other arctic databases were examined. None were problem free. In the end it was decided to devise a system for merging the BOREAL and ASTIS databases on the basis of the data elements currently contained in the two

databases, together with a list of the end products desired. Stated simply, what products did we want the database to produce and how could we merge the elements and data of the two databases in order to produce them? A list of individual products required by each institute, as well as a list of joint products, was drawn up. The individual products reflected the needs of the particular institute. For example, since the BOREAL database is used to produce spine labels for items housed in the collection, the merged database should have this capability. Joint products included formats for online searching, formats for a current awareness bulletin and tapes for online vendors.

It was necessary to work through the two file definitions element by element identifying changes which would have to be made to the data and/or elements in one database or the other or both. In order to arrive at a cost estimate, it was also necessary to identify whether the changes could be done through computerized procedures or whether these changes would have to be done manually. If manual changes were involved, what level of skill was required by the personnel involved?

The total estimated cost of the merger was \$392,350. This does not include the cost of maintaining the database once the merger has been completed. A general breakdown of costs is:

Management - \$96,000.

2 people working half-time for 2 years, 24mo x \$4,000  
This management cost reflects the amount of time that existing management staff will spend organizing, supervising, problem-solving, etc. during the merger. While this cost may be paid out of existing core budgets, it represents other activities or projects that ASTIS or the Boreal Library would have to forego during the merger period.

Systems analysis, programming, etc. - \$21,000.

Approximately 6 months x \$3500

Documentation (Indexer's Manual) - \$8,000.

General computing costs - \$25,000.

Includes the development and testing of new software, and the cost of adding records to the new database. Excludes cost of eliminating duplicate records and converting old records to the new format.

Equipment - \$20,000.

Cost of additional terminals and/or microcomputers for the new staff required for the merger. Additional microcomputers would reduce computing costs because records could be edited offline.

Elimination of duplicate records - \$16,500.

Record conversion - \$43,350.

Subject/geographic indexing, assuming both UDC and thesaurus indexing are used on all records - \$162,500.

These costs were based on the assumption that none of the existing resources of either Institute will be utilized. Use of existing management staff could reduce the amount of outside funding needed to approximately \$300,000. Using existing indexing/cataloguing and clerical staff could reduce the needed outside funding to as little as \$100,000 if much of the normal operations of the two organizations were suspended for the period of the merger. The expertise needed to merge the databases does exist within the institutes.

The major problem that remains unresolved relates to subject/geographic indexing. Approximately 40% of the cost of merging the databases is directly related to this problem. Each institute uses a different indexing scheme. A limited study suggests that an automated concordance between the two schemes is not feasible. Agreement cannot be reached regarding the use of one scheme even though it is agreed that the use of two schemes represents not only a considerable duplication of effort but an added complication for the user. It was therefore recommended that a more detailed study of geographic and subject access should be undertaken before merging the two databases. Schemes other than those now used by the two institutes, including the use of no controlled vocabulary at all, need to be examined. User needs and preferences as well as the implications of either or both institutes changing their current methods of access must be investigated.

All costs relating to the merger of the two databases, the production of joint products, and the continued storage and development of the merged database would be divided evenly between AINA and Boreal. All revenues from the joint database would be evenly shared. Once the merger was complete, however, each institute would be responsible for adding and updating its own records, producing its own in-house products and providing its own in-house search facilities.

It is estimated that the merger of BOREAL and ASTIS would take at least two years to complete.

#### Toward a Canadian Polar Information System

From the beginning of this study of a possible merger of BOREAL and ASTIS it has been recognized that the only hope for finding the necessary funding would be a commitment by the Government of Canada to the creation of a national polar information system. Such a system was recommended in the report Canada and Polar Science in May 1987. Following a meeting in Yellowknife in June 1987, a group of 19 agencies and organizations with an interest in northern research recommended that such a system be based on the integration and expansion of BOREAL and ASTIS.

The recommendations in Canada and Polar Science were recently the subject of a study done for the Minister of Indian Affairs and Northern Development by Professor Thomas Symons. In his visits to Boreal and AINA Dr. Symons seemed sympathetic to the idea of using BOREAL and ASTIS as the core of a Canadian Polar Information System. His report has recently been presented to the Minister, and we can only hope for a positive result.

Three major enhancements will be necessary to develop a national system from a merged BOREAL/ASTIS database. The first is a change in the way that the system is managed. Rather than reporting to Boreal and AINA, a national system would be directed by a Management Committee that reports to, or is a subcommittee of, the Canadian Polar Research Commission. It is important that

the end users of polar information in Canada be strongly represented on the Management Committee. It is the users of information that should set goals for the system and evaluate its performance. A second necessary enhancement is a mechanism to feed information from the many smaller northern information centres in Canada into the national system. Funding should be provided to these smaller centres to cover the cost of gathering and submitting information in their particular subject or geographic area. The third enhancement is improved capability to handle the French language. Both BOREAL and ASTIS contain French material and are searchable using French commands, but neither system displays accents or has a French version of its controlled subject vocabulary.

It is gratifying that this study has lead the way in increasing communication and cooperation between the Boreal Institute for Northern Studies and the Arctic Institute of North America. Cooperation is possible between institutes, and information systems, with different mandates and clientele. Our two institutes look forward to extending this cooperation both within Canada and internationally.

# Northern Libraries Colloquy Networking "Links" Survey Results

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In preparation for the Twelfth Northern Libraries Colloquy, and in keeping with its networking theme, a questionnaire was sent out with each invitation to the Colloquy (see fig. 1). The survey had the simple object of determining what means currently exist to provide further communication and cooperation among the units comprising the polar library community.

## NORTHERN LIBRARIES COLLOQUY NETWORKING "LINKS" SURVEY

In keeping with the theme of the Twelfth Northern Libraries Colloquy, we would like to be able to share with each other information on hardware, software, e-mail etc. Please complete the chart below, as well as the questions following. Please circle each answer that applies to you, and use the lines provided for additional information.

<p><b>1. Commercial Database Vendors</b></p> <p>A. DIALOG B. ORBIT C. ERS D. STN E. QL SYSTEMS F. OTHER _____</p>	<p><b>2. Databases searched for northern info.</b></p> <p>A. GEORF B. GEOBASE C. GEOARCHIVE D. BIOSIS E. NTIS F. COLD G. ASFA H. COMPENDEX I. ASTIS J. OTHER _____</p>	<p><b>3. Utilities membership</b></p> <p>A. OCLC B. WLN C. RLIN D. UTLAS E. OTHER _____</p>	<p><b>4. Electronic mail</b></p> <p>A. DIALMAIL B. BITNET C. ENVOY 100 D. OTHER _____</p>
<p><b>5. Software- Database manage.</b></p> <p>A. DBASE III B. INMAGIC C. DATATREK D. OTHER _____</p>	<p><b>6. Hardware - (model or line)</b></p> <p>A. IBM _____ B. APPLE _____ C. DEC _____ D. TRS _____ E. VAX _____ F. MAINFRAME _____ G. OTHER _____</p>	<p><b>7. Software- Wordprocessing:</b></p> <p>A. WORDPERFECT B. WORD C. WORDSTAR D. PC-WRITE E. OTHER _____</p>	<p><b>8. Software- Communications:</b></p> <p>A. PC-TALK B. FUSLARCH C. SMARTCOM D. OTHER _____</p>
<p><b>9. Newsletters Annual Reports</b></p> <p>A. NORTHERN LIBRARIES BULL B. INFO NORTH C. NORTHLINE D. NORTHERN PERSPECTIVES E. NEWSLETTER ... GREENLAND F. SPRI G. AINA H. BINS I. OTHER _____</p>	<p>10. Do you have an online catalog which is accessible outside of your library? Yes No If yes, please give details. _____</p> <p>11. Are you willing and/or able to share your cataloging by exchange of floppy disks? Yes No If yes, please give details. _____</p>		

NAME: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_  
TYPE OF LIBRARY: GOVERNMENT ACADEMIC CORPORATE OTHER \_\_\_\_\_

U.S. Participants: Please fill in, fold, staple, stamp and mail!  
Non-U.S. Participants: Please fill in, put in an envelope and mail to address on back!  
ALL: PLEASE RETURN BY APRIL 1 SO WE CAN DISCUSS RESULTS AT COLLOQUY.

Figure 1. "Links" survey form.

The results were presented at the business meeting of the Northern Libraries Colloquy on June 9, 1988. Because of the simplistic nature of the questionnaire itself, no attempt has been made at a complex statistical analysis of the results.

Thirty-two libraries and database preparers are represented in the survey; all but three were represented at the colloquy. For purposes of discussion here the order of items in the questionnaire has not necessarily been adhered to.

Virtually all of the respondents to question 6 were using computers. Twenty-two were using IBM-compatibles and an equal number were using a variety of other sorts. Some are using more than one type of computer, and 2 reported use of a modem. Software (questions 5, 7 and 8) for use

in word processing, communications, and database management has already diversified beyond a point where a common brand could be recommended. This is probably not important with technological compatibilities underway at present.

In the area of electronic mail (question 4), DIALMAIL, BITNET, AND ENVOY 100 are used almost equally (7-9 users each), with other systems showing 1-3 users each. Approximately one third of the libraries responding do not use electronic mail.

Judging by the replies to question 9, newsletters (especially the Northern Libraries Bulletin) and annual reports are heavily used by nearly all libraries as information resources and communications channels.

Utilities membership (question 3) is presently enjoyed by relatively few (less than 10) of the respondents, with most belonging to OCLC, UTLAS, WLN or RLIN in that order. Some libraries are using two or three utilities.

Of the commercial database vendors (question 1), DIALOG has almost twice as many users (20) as the next ranked, ORBIT (11). QL Systems (8), BRS (6) and CAN/OLE (5) were next in order.

The subject-oriented databases searched for northern information (question 2) showed GEOREF (12 users) and BIOSIS (11 users), both available from more than one vendor, leading but followed closely by several others such as NTIS (9), GEOARCHIVE (8), ASFA (7), and COMPENDEX (7). The polar/cold regions oriented databases showed COLD (on ORBIT only) to be most heavily used (11), followed by ASTIS (QL Systems only) with 11 users and BOREAL (CAN/OLE, available only in Canada) next with 6 users.

Questions 10 and 11 apparently could not be answered easily due to the range of possible answers! Nearly half of the respondents are cataloging on systems that are, or could be, used for sharing. Five of these are willing to exchange cataloging on floppy disks with certain qualifications.

### Conclusions

This brief survey has brought to light many interesting situations, and while it shows several areas of common ground, it also points to some avenues for improved communications and cooperation.

Obviously the written word is still very important even in the computer age, as demonstrated by the heavy use of newsletters, annual reports, etc. Electronic mail, by comparison, is only slowly catching on.

Online searching is still oriented around the two largest vendors. It is also oriented around the large, comprehensive subject-oriented databases, especially those accessible on more than one vendor. Searching the polar/cold regions databases appears to be much less common, leading to several areas of speculation but no hard facts. Their small size and availability through separate vendors could be contributing to their limited use.

Utilities membership is limited in numbers of institutions, but these members tend to be the larger libraries and therefore could be a very important source of shared cataloging.

The willingness and desire of the polar library community to further share cataloging and other resources is a positive sign, but some assistance, both financial and technical, may be necessary for this to be achieved.

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# The Stefansson Collection: Past, Present, Future

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When Vilhjalmur Stefansson came out of the Arctic in 1918, after five years as leader of the Canadian Arctic Expedition, he came out to a different world. He and his men had missed the violent and terrifying events that shook Europe from 1914 to 1918 and forever changed the world. Stef, for that is what he was called by everyone, had spent only eighteen months of the previous twelve years out of the Arctic. The world had changed and Arctic exploration was about to change. The Canadian Arctic Expedition was one of the last major expeditions that was unsupported by radio or airplane.

Stef changed, also. No longer was he the dashing figure sending newspaper reports of the expedition's exploits from a nearly unknown Arctic. Instead, Stef became one of the most vocal proponents of the exploration of the Arctic. From 1918 to his death in 1962, Stef was never far from the speaker's platform or from his typewriter at which he produced 33 monographs, contributed substantially to 49 others and published 375 articles (Mattila, 1978). It was the income from his lectures and the royalties from his publications that supported what his most recent biographer called his "pleasant obsession," the accumulation of his polar library (Hunt, 1986, p. 161). As soon as Stef received a check, it was cashed and spent for books needed.

Stef began to acquire books and offprints because he could not find them in the libraries he frequented in New York City and because it was more convenient to have them at hand when he needed them. "Stefansson would receive his visitors seated behind a desk that was placed on a low platform. As he talked, or when he needed a reference, he would stalk around the library to find the book or magazine article that would verify his point. Books were everywhere, even under the kitchen sink and stacked between spices and baking soda on his kitchen shelves (Hunt, 1986, p. 242)." Photographs of his apartments in New York substantiate this description. Stef selected apartments based on the amount of space for his books and the load-bearing capabilities of the structure. By 1951, Stef and his wife Evelyn were living in four adjoining apartments at St. Mark's Place in

Greenwich Village. Even this was not enough; a new site needed to be found.

That site was to be Dartmouth College. Stef began his association with Dartmouth in 1929 when he gave a series of four lectures to the student body. He would continue to visit the campus and lecture for the next twenty years. In 1947, the college asked Stef to advise on the development of the Northern Studies Program. From that time on, there were at least four visits annually. Stef would lecture and demonstrate during each of the visits and, in the winter, would delight the students by constructing snow-houses for them on the Green in the center of campus.

In 1951, Stef decided to place his library on deposit at Dartmouth. The transfer required three large vans. That same year, a generous alumnus agreed to purchase the collection for the college. Stef agreed, but only if he could donate half the collection as his and Evelyn's gift to Dartmouth. The library and Stef were installed in Baker Library where the collection remains today as a part of the Special Collections. Stef's gift and his presence were the final pieces in the development of the Northern Studies Program that was formally established in 1953. From that time until his death in 1962, he was consultant to the collection and he determined the scope and thrust of acquisitions. In 1967, the eight-volume Dictionary Catalog, reflecting holdings at the time of Stef's death, was published (Dartmouth College Library, 1967). The catalog remains a useful access tool for the collection.

The direction given to the collection during Stef's lifetime was immediate. As a result, there was no written collection policy to guide the staff in acquiring materials after his death. A policy was prepared in 1965 that was to have unexpected consequences (Dartmouth College Library, 1965). The new policy set definite bounds, both chronological and geographical, for the collection. Events before the year 1925 and latitude 60° North were established as the limits for Arctic materials and 1940 and latitude 60° South were the limits for Antarctic materials. The decision to restrict collecting to materials relating to or recounting events prior to these years and within the geographical bounds was an attempt to focus a core collection on the history of polar exploration prior to air- or radio-supported expeditions. It was thought that the resources of the collection could be best utilized by concentrating on these areas rather than attempting to collect a wide range of materials that were being published at a greater and greater rate. The college library was acquiring monographs and serials relating to polar studies as a matter of course when the materials were published and there was no need to duplicate those items within the Stefansson Collection. It should also be noted that the U.S. Army's Cold Regions Research and Engineering Laboratory was formally opened in May of 1963, just one mile north of the campus and the rich bibliographic resources of that installation were and are available.

Materials that were in the Stefansson Collection in 1965 that fell outside of the new definition were transferred to the appropriate library on campus. If volumes were found to duplicate holdings or were duplicated

within the Stefansson Collection, those volumes were sold and the income accrued was used to increase the Stefansson Fund, one of two endowments supporting the collection. No materials were sold or discarded that were not duplicated within either the Stefansson Collection or the other libraries on campus. The acquisition of rare or unique items, such as manuscript and photographic collections, was to be the major emphasis of the collection.

Unfortunately, this was not the impression that was gained by a segment of the polar community outside of Dartmouth. There was an outpouring of concern, both in the press and in letters to the college, regarding what was seen as the "dismantling" and "destruction" of the Stefansson Collection. So strong was this outcry that there remains, after over twenty years, the sense in the minds of some scholars that the collection no longer exists.

While the question of the scope of the collection had been resolved, there remained the problem of intellectual access. This was resolved when, in 1981, Dartmouth was awarded a \$150,000 grant under the auspices of Title-IIC of the U.S. Department of Education (Dartmouth College Library, 1981). Entitled, "Strengthening Polar Resources," the eighteen-month grant provided funding for both preservation of the collections and the much needed intellectual access points.

Preservation was one of the major aspects of the grant. Each printed item was examined and conservation work, if needed, was prescribed. Minor repairs, restoration of cloth bindings and boxes were made in the conservation shop within the library. Volumes in need of more extensive repairs or restoration of leather bindings were sent out to one of several conservators to be conserved. The result of this part of the grant was that all volumes are now in useable condition and can be handled by students and scholars with little fear of the materials disintegrating in hand.

A second aspect of the project was the reprocessing of the manuscript collections. Each collection was examined, reprocessed and rehoused in proper folders and containers. For collections larger than one container, a guide was prepared for the collection to permit better intellectual access. One guide, for Stef's own papers, was published (Dartmouth College Library, 1982); the others are in typescript and are available for distribution to interested students and scholars.

Perhaps the most important result of the grant was the recataloging of all monographs, serials and manuscript collections into machine-readable form. All materials were cataloged in the MARC format using AACR2 rules and Library of Congress headings. The data was then entered into the Research Libraries Information Network (RLIN) of the Research Libraries Group (RLG). It was also entered into the on-line catalog at Dartmouth making it accessible, for the first time, from anywhere on campus.

The impact of the recataloging project was immediate and greater than had been expected. On campus, there was a rapid increase in the amount

of use of the collection by both students and scholars. It was evident from comments made by the primary user group that access was better and that individual scholars were finding more and more material that had been previously unknown to them. They were clearly pleased with the change. What was not expected was the increase in use of the collection by students and faculty not closely involved with polar research who, by using the on-line catalog, had stumbled upon materials of interest to them or of use to them in research. This serendipitous access to the collection has changed the course of study for several Dartmouth students.

Even more interesting has been the experience with working in a national utility. There are, to be sure, some positive and some less than positive aspects of using RLIN. Full membership in RLG as an owner member, there are currently 36, is expensive although there are special members who are active in only a small part of the consortium. The focus of RLG is not solely on RLIN, although this is the most visible aspect to the public, but also on programs such as preservation, collection development, public services and the newest program for archives, manuscripts and special collections. The data-base of RLIN holds approximately 141,000 archival and manuscript records and over 26 million monographic records. Access to this information is paramount in research as it is the largest and most current bibliographic tool available. In combination with electronic mail and inter-library loan functions, materials can be located and copies obtained in a very short time.

Use of the MARC format and AACR2 cataloging rules have also improved access. Cataloging to an international standard means that there is uniformity in the intellectual access points. One can search catalogs in a variety of institutions using the same access points and know that the search has been thorough. The authorities file in RLIN, provided jointly by RLG and the Library of Congress, contains over 3 million records and has proven to be a particularly useful tool. The MARC format means that data could be transferred from one institution to another. For example, we tag all materials that belong to the Stefansson Collection and all polar materials so that this data can be stripped from the data-base and supplied, at cost, to another institution.

There are some technical restrictions in the RLIN data-base. One of the prime examples of this is the amount of data that can be entered into a single record. Once 9.5 screens of data is reached for a single record, it tends to become unstable and one may or may not be able to retrieve the record searching on a single access point such as the name of one of the correspondents. Stef's own correspondence (Stef Mss 196), from 1895 to 1962, consists of 162 linear feet of papers. This does not include his manuscripts or working papers. The record for the correspondence contains 109 author and subject entries as well as the main and title entry. This is the limit for access points to this collection. While there are literally thousands of correspondents and subjects within the collection, we were forced to be highly selective in assigning the entries.

Working within the RLIN data-base also encouraged us to rethink the structure of the Stefansson Collection and our other polar holdings. Collection development policies were created for the Stefansson Collection and for Polar and Cold Regions which encompasses collecting guidelines for all eight libraries on campus. These policies set the broad outlines of our collecting activities and provide guidance to bibliographers, catalogers and reference staff.

The result of having records of the Stefansson Collection in a national data-base is as expected. A greater number of inter-library loan requests have been filled and a much larger number of researchers have made use of the collection. Data indicate that use has increased approximately 20% each year since the recataloging project and the entry of the data into RLIN. There is no reason to believe that the rise in use will not continue. If intellectual access and increased use are the goals of an institution, then a national utility such as RLIN is clearly one avenue of approach that has proven successful.

Currently, the collection contains 3050 monographs, many of which would be considered rare books, 48 linear feet of vertical file materials, 205 manuscript collections totalling some 530 linear feet of material, and approximately 15,000 photographic images. The collection is used by approximately 300 students and scholars annually from brief visits to extended periods of research. Students in particular are encouraged to make use of the collection. Aside from the obviously unique materials such as the photographs and manuscript collections, many of the books are exceedingly difficult to find elsewhere. An example of the broad scope of the collection is the edition of Bradley Robinson's The Dark Companion in Swahili (Robinson, 1950). We may be one of the few polar libraries containing materials in that language. Language, of course, is not a consideration in the acquisition of materials.

In the past five years, we have been able, as a result of the work done in 1981 and 1982, to acquire a number of important manuscript collections as well as to fill in gaps in our monographic holdings and purchase newly-published materials. Of particular interest are two small collections relating to the ill-fated Lady Franklin Bay Expedition of 1881-1884. George Rice was the expedition photographer who, as the expedition floundered, took on more and more responsibility and quickly assumed a leadership role. His diary (Stef Mss 186) commences in July of 1881 in a firm hand. It details the day to day events of the expedition at first in broad strokes and later, when food became the focus of every moment of the day, the pathetic attempts at fishing and hunting. The last entry of the diary, written on August 2, 1883, makes it clear that Rice knew he would not survive the expedition.

A second collection (Stef Mss 189) contains the diary of Sergeant David Brainard from March 1-June 21, 1884, as well as other papers and photographs of Brainard relating to the expedition. The diary is a most interesting document as it has never been published in its entirety. Both of Brainard's books on the expedition (Brainard, 1929; Brainard, 1940)

purport to contain the diary as written. There are, however, significant omissions and silent corrections to the diary that have a material effect on the historical record. A new edition of this diary, complete and unexpurgated, would be of great value to the study of this expedition.

There is no recent, fully documented study of the Lady Franklin Bay Expedition. Several studies have been published in the last decades without documentation and without access to the Rice and Brainard materials noted here. As materials are acquired by institutions, such as the original, holograph orders of June 5 and June 6, 1884, of Lieutenant Greely ordering the execution of Private Charles B. Henry for theft of food, which we recently acquired, it becomes more apparent that such a study is imperative.

George Melville was the engineering officer on board the Jeannette during the expedition commanded by Lieutenant George DeLong. Melville's "conduct book," his journal from October, 1881 to July, 1882, and his letter book from June, 1881, to July, 1882, are of great interest to students of that particular expedition since they add detail and flavor that is not to be found in any of the published records of the voyage (Stef Mss 188). The three volumes serve as an important adjunct to the printed and manuscript materials available to researchers and we were most fortunate to be able to acquire the manuscripts for the collection.

"What I would prize and value, should it ever materialize, would be the official recognition by my country..." wrote Robert Peary in October, 1910. In a small but rich collection of his letters (Stef Mss 198), some forty of them, Peary complains of the lack of recognition of his claim to the conquest of the North Pole and the concurrent recognition of Frederick Cook's claim. While the correspondence offers no new evidence to support Peary's claim, it does give insight into his concern. What is equally of interest in this collection we recently acquired are the over 600 working photographs that Peary took and used in his publications. The notes on many of them show how he worked to crop, highlight, annotate and manipulate the images for illustrative purposes. A study of the use and manipulation of these images by Peary could prove to be of use in the study of the man himself.

Closely related to Peary are the correspondence books of Henry Bryant. Bryant was a member of the Peary Relief Expedition of 1892 and the Peary Auxiliary Expedition of 1894. His correspondence books (Stef Mss 205) contain carbons of letters with Peary, Frederick Cook, Frederick Dellenbaugh, Albert Operti, George Melville, A. W. Greely and Sir Ernest Shackleton to note several of the more prominent explorers. The correspondence contains a wealth of information on the work of these men and their relationships. Since Bryant was corresponding with men who often declined to be in direct contact with each other, he sometimes acted as a conduit for information.

The Stefansson Collection has been able to obtain these recent acquisitions through the generosity of donors and through the specific focus

of the collection which permits resources to be expended on what are often very expensive collections. Such acquisition activity will continue in the future.

Future activities include three specific projects. The first is to convert a manual index to Stef's correspondence from a manual card file to a data-base. The correspondence is voluminous, 162 linear feet of it, and it is with many of the key figures connected with polar activities for over seventy years. The manual file is useful, but a data-base would allow for more flexibility and more complexity in the search strategy. The conversion project will take approximately a year and should be completed by the middle of 1989. When completed, the file will be mounted as a public data base.

A second project is to convert the typescript guides to the 205 collections into machine-readable form. Once converted, these guides will also be mounted as a public data-base. The resulting file will allow a researcher to examine, to the folder level, all collections. It is assumed that the data-base will be searchable so that all information relating to a subject or individual in all collections will be immediately available. It is planned that this project will be completed in two years.

The third project is to prepare and publish a guide to the manuscript collections within the Stefansson Collection. The manuscript and archival holdings of the collection are an important resource for researchers interested in the history of polar exploration and such a guide should prove to be a useful bibliographical tool. It is expected that this will be ready for publication in 1989.

Finally, under the auspices of the Dickey Endowment for International Understanding at Dartmouth College, a proposal has been circulated entitled "Developing an Arctic Information Network Using Current Computer Catalogs." This proposal seeks to provide access to the existing or planned on-line library catalogs of Dartmouth College, CRREL, McGill University and the University of Alaska at Fairbanks. If accepted, the project would allow direct access to the four library catalogs electronically. Planning and discussions are currently under way and a functioning link could be in use before the end of 1988. This proposal has the added benefit of acting as a feasibility study for a much larger Arctic information network.

The Stefansson Collection, then, has had a long life. After Stef's death in 1962, the focus of the collection was more clearly defined and this allows for the acquisition of important and often expensive items or collections. The use of a national data-base and current standards as a cataloging tool permits easy access to the rich and varied materials within the collection. In the future, electronic media will permit even greater access and availability to the collection.

### Acknowledgement

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# **OCLC Use in Polar Libraries: A Case Study**

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## Abstract

The future of the Goldthwait Polar Library is the subject of discussion between Byrd Polar Research Center management and the Ohio State University Libraries. It has been suggested that the GPL become a department library. At this time we are unsure if it would be to our benefit to make this administrative move for various reasons. One reason for concern is the immense size of the OSU Library System. We are unclear as to whether or not the OSU Library will be able to meet our particular needs in regard to technical services in a reasonable amount of time. With these concerns in mind, the GPL conducted a study to determine how many of its new acquisitions were found already cataloged in OCLC and how much duplication exists between our holdings and the OSU Libraries.

While the study showed that 91% of the GPL's new books were found in the OCLC Online Union Catalog, when the other categories, (technical reports, theses, new serial titles, and Russian material) were taken into account, the total number of titles found in the Union Catalog dropped to 66%. Some general assumptions about the future use of OCLC by polar libraries can be made. The study results indicate that OCLC may not be the most suitable bibliographic utility for our library or for other polar libraries.

## Introduction

The future of the Goldthwait Polar Library is the subject of discussion between Byrd Polar Research Center management and the Ohio State University Libraries. It has been suggested that the GPL become a department library. At this time, we are unsure if it would be to our benefit to make this administrative move for various reasons. One reason for concern is the

immense size of the OSU Library System. With over 23 department libraries, we are unclear as to whether or not the OSU Library System will be able to meet our particular needs in regard to technical services in a reasonable amount of time. As one of the smallest libraries on campus, we do not want to be lost in the crowd.

The OSU Library System is the 16th largest library in the United States, with over 4 million printed volumes and two and a half million microforms. Their circulation system is fully automated and their acquisition system is in the process of becoming fully automated. Their Technical Services Department is centralized in the Main Library building, and not only handles material received for the 23 department libraries, but also material for the 16 small departments within the Main library itself. The Cataloging Department catalogs approximately 65,000-75,000 monographic titles a year (Crowe, 1988, p.3). The Library Control System (LCS) is their on-line catalog and also serves as their circulation system. Presently there are plans to consolidate department libraries on campus by disciplines and to operate a book depository as there is not enough space in the libraries to house the expanding collections. It should be noted that very few libraries or reading rooms on campus are not part of the OSU Library System; the GPL is one.

If we become a department library, the OSU Libraries Technical Services Department would handle all of our acquisitions and our cataloging, with the exception of reprints. The OSU Library System is a member of OCLC, while the GPL is not.

With these concerns in mind, the GPL conducted a study from April 1, 1987 to April 30, 1988 to determine how many of its new acquisitions were found already cataloged in OCLC and how much duplication exists between our holdings and the OSU Libraries. We hope that the results of this study will enable us to anticipate any special needs for technical service support from the OSU Libraries should we become a department library.

General assumptions concerning the future use of OCLC by polar libraries can also be made. The study results give a good indication of the types of polar material found in the database and identifies what material is not represented at all. The findings may have specific implications for the use of OCLC as an interlibrary loan tool. And finally, if given a choice, should other polar libraries choose to become members of OCLC, choose another bibliographic utility, or create a network of their own?

The OCLC Online Union Catalog is the largest database of library bibliographic information in the world. OCLC claims that most member libraries using the Union Catalog will find records for approximately 94% of their items. Do polar libraries fall under the category of "most libraries"? Our past experience indicates that monographs from major publishers will be found both in OCLC and LCS, OSU Libraries' on-line catalog, while material we receive as gifts or on exchange, such as technical reports will not be found in either. The material we receive from other polar institutions does not always have wide distribution and in that way our collection should be unique.

## Cataloging

The GPL does not belong to any co-operative cataloging network, nor do we yet have an on-line catalog. When new material is received, we check the OSU Libraries on-line catalog, LCS. If they have cataloged the material, we use their call number and their subject headings with minor modifications. For example, we change subject headings to match our card catalog; we use the subject heading "Antarctica" rather than "Antarctic Regions". We also elaborate on some LC subject headings to make the card catalog more useful to our patrons. When new acquisitions are ordered at OSU Libraries an author/title record is created and added to LCS. Even though an item may be uncataloged, the patron knows that it has been ordered or has been received and is somewhere within technical services. Upon patron demand it then may be rush cataloged. If an item is found on LCS as being ordered, but not yet cataloged, the GPL waits for it to be processed. We try to match their records whenever possible. If there is no record on LCS, we check OCLC and use their record. We accept any record from that database, but if there is more than one record to choose from, we use the Library of Congress (DLC) record. We also rely on Library of Congress "Cataloging in Publication" data as well. Then if all else fails, we do original cataloging and if necessary add a LC call number to an already existing record.

## The Study

During the study, all the items received were divided into five categories: 1) books, 2) technical reports, 3) theses, 4) new serial titles, and 5) Russian titles. For the purposes of the study, if the new item was found on LCS we assumed that we did not need to check OCLC, as presumably all of OSU's records should be found in OCLC. If the item was found only in OCLC's Union Catalog, it was necessary to see if it had "acceptable cataloging" by OSU standards. OSU Libraries will only accept an OCLC record if it has an LC call number and reasonable subject headings. If the record is acceptable, the item goes to copy cataloging, if not, it goes to original cataloging. This is very important in the scheme of things because of the backlog in the Technical Services original cataloging department.

Separate lists of the five categories were kept and the new titles were tagged as being in 1) LCS, 2) OCLC with acceptable copy, 3) OCLC without acceptable copy, and finally, 4) not in either database. At the end of the study all the titles were checked on LCS and OCLC to catch any that may have been cataloged while the study was in progress.

## The Results of the Study

Our library received 71 new books during the study period. Of these 71, 23 titles (32%) were found in LCS and 40 (56%) were in OCLC with acceptable cataloging. Two of the titles (3%) were found in OCLC but did not have acceptable cataloging. The other 6 titles (9%) were not found in either database. The total number of new books in OCLC, including those books in LCS, was 91.5%, which is close to the 94% OCLC claims for "most libraries." (All the percentages in the results have been rounded.)

Of the 42 technical reports the library received, 27 of them (64%) were not in either database. Eight (19%) were found in OCLC with acceptable cataloging and five (12%) were found in OCLC, but did not have acceptable cataloging. Only two titles (5%) were found in LCS. Some of the reports may have been in LCS as serials, but for our purposes they were not cataloged as separates; therefore the records could not be used. Of the five reports which were found in OCLC without acceptable cataloging, three had serial call numbers and two did not have LC call numbers at all.

Of the 21 theses received during the study, ten of them (47%) were in LCS, two (10%) were on OCLC but did not have acceptable cataloging. Nine titles (43%) were not found on OCLC or LCS, although two theses will be added eventually because they are OSU theses. Theses from foreign universities were not found in either database. The total number of theses found on OCLC, including the titles on LCS was 57.5%

The GPL received 23 new serial titles. Ten of them (34%) were not in either database, 11 titles (38%) were in OCLC with acceptable cataloging, and four (14%) were in OCLC without acceptable cataloging. There were also four titles (14%) found on LCS, but of the those four, only one of them was polar related. The total number of serial titles in OCLC was 66%.

Russian material was transliterated and then checked. Of 14 titles, 9 (64%) were not in either database, and none were found in LCS. Four titles (29%) were in OCLC with acceptable cataloging and one title (7%) was found in OCLC, but did not have acceptable cataloging. The total number of Russian titles found in OCLC was 36%. All the results of the study are illustrated in Figure 1.

### Original Cataloging

Original cataloging is an expensive undertaking, but as a member of a bibliographic network, each library is responsible for adding items on a timely basis. In a 1986 article in Technical Services Quarterly, Donald Share addressed the issue of shared cataloging in OCLC (Share, 1986). He examined OCLC's "Code of Responsible Use for OCLC Participating Libraries" and in particular, the importance of prompt input into the OCLC database. He made several valid comments concerning what is expected of OCLC member libraries as compared to what the actual practice is in most libraries. Share noted that many libraries follow the assumption that it is easier and cheaper to hold material for an indefinite period of time and wait for a record to appear, than it is to do original cataloging. The chances that sooner or later someone will catalog the item that you have on hold increases with time. Share believes that this is a disservice, not only to patrons who may need the material, but also to other libraries within the network.

Share ended his paper with the statement, "Unfortunately, too many of us are still waiting" (Share, 1988, p.22); a sentiment which may be repeated if the OSU Libraries becomes responsible for the GPL. OSU Libraries' Technical Services Department readily admits that they must do original cataloging for 10-15% of their monographic titles (Crowe, 1988, p.4). In all fairness to the OSU Libraries, the holding of their uncataloged new items is unintentional,

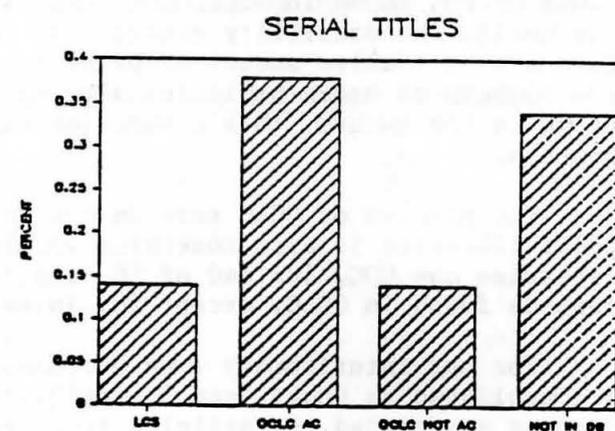
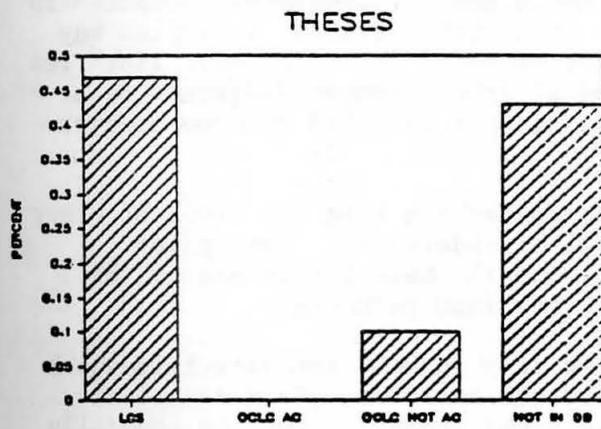
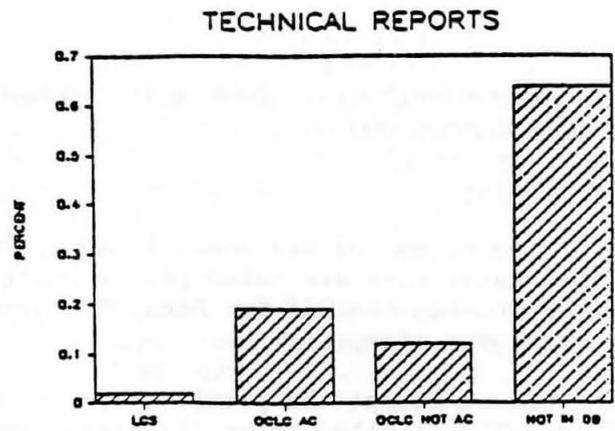
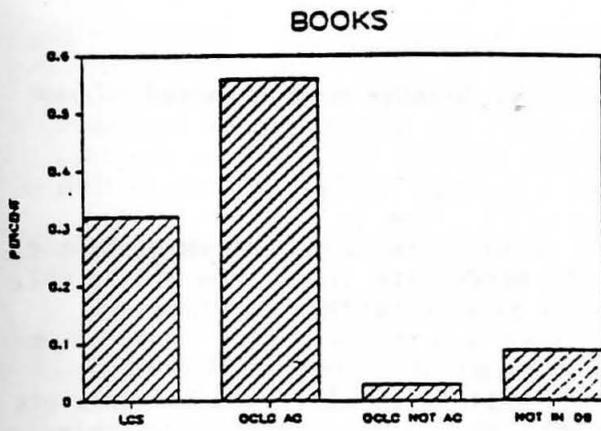


Figure 1. Results of the study.

but they nevertheless have a tremendous backlog because of the amount of new material they receive.

### Conclusion

The number of new books found in OCLC looks impressive, but when all the other categories are taken into account, the percentage drops from 91% to 66%, far less than the 94% for "most libraries." This percentage may however change over time.

If we accept the premise that the Goldthwait Polar Library's holdings are comparable to other polar libraries, then OCLC may not be the most suitable bibliographic utility for our needs. Since this study only reflects material found or not found in OCLC, and OCLC is the largest bibliographic database in the world, the possibility exists that the other bibliographic utilities may have even a smaller amount of polar related records. As some polar libraries are members of other utilities already and if others choose different databases in the future, this assumption may no longer be valid or even a major concern.

The problem of OCLC records not being compatible with the needs of other polar libraries is also something worthy of consideration. Some polar libraries use UDC, instead of LC, and consequently have little use of the records found in OCLC, except for interlibrary loan purposes.

For our interlibrary loan purposes, we rely on OCLC for materials which are published as books, and in verified journal articles. When technical reports are needed, or articles from serials not found in OCLC, we generally request copies for the library from the issuing agency or contact the authors directly. So far this approach, while time consuming, has been very successful. Due to the hit rate of reports found in OCLC it looks like this practice will continue for quite some time.

Locating theses and obtaining them for our patrons has sometimes been difficult. We use OCLC records for interlibrary loan, and also order theses from University Microfilms, but as this study demonstrates, theses from foreign universities are not found in the databases. As a partial solution to this problem, we have begun setting up theses exchanges with other polar centers. Also, as the OSU Library System is a member of the Center for Research Libraries, we can submit our requests to their Foreign Doctoral Dissertations collection, via the OSU Library Interlibrary Loan Department.

If we become an OSU department library, we will undoubtedly have to make special requests of the Technical Services Department. For example, we would not want our technical reports to be treated as serials. They are more useful to our patrons if they are cataloged as separate monographs, with author/title and specific subject access. A great number of our serial titles have analytics as well. Technical reports and some serial titles would obviously require more time in the original cataloging section.

As a department library, all of our holdings would be added to OCLC and LCS; and it would seem doubtful that we would be able to formally join any

other networks. If we remain a separate entity, and continue to grow at our present rate, we may choose to become a member of OCLC by ourselves in the future. But more than likely, it would be to our benefit to explore other alternatives before making any final decisions, especially since at this time we have yet to begin any on-line projects. Joining other polar libraries in a network is one possibility which may prove to be beneficial.

#### Acknowledgements

Peter J. Anderson critically reviewed this paper and made many useful suggestions. Regina Brown also made helpful suggestions during the study. This is Byrd Polar Research Center contribution No. 629.

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# Of Lasers, Crabs and Arctic Research

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## Abstract

Optical information storage ala cd-rom is the hot topic of discussion among librarians at conferences and cocktail parties this year. It's not the holy grail of information management one might be led to believe from some of the prophetic papers and articles appearing about this latest storage device. It does, however, provide a useful tool which can increase access to information.

Rasmuson Library at the University of Alaska, Fairbanks is exploring applications of the cd-rom tool in two projects. One effort is to convert the gray literature published by the university's Sea Grant Program into a digital format and eventually to a cd-rom product for widespread distribution. The other project will convert the Arctic Bibliography to a computer readable format which can then be stored on cd-rom or some equally convenient storage medium.

This paper discusses the critical thinking for moving in this direction, and the process of going from paper to optical storage.

## Introduction

This paper is about two projects that did not receive funding, or should I say, have not yet received funding. Both projects have to do with creating electronic data bases and the possibilities of placing those data bases on cd-rom - hence the laser in the title of my paper. One project is to convert the gray literature of the University of Alaska's Sea Grant Program, about 26,000 pages of text and images, to an electronic format and make it available as a cd-rom product. Therefore, the crabs in my title. The other project is to convert the 16 volumes of the Arctic Bibliography, over 108,000 citations into a data base. The resulting file would be made available online through ASTIS, and possibly available as a cd-rom product. Thus, and finally, the arctic research in my title.

Neither of these projects was funded in the first attempt. They were not funded for what I think are some sound reasons related to the current hazards of work in the realm of data bases and optical storage (for purposes of this paper, let's assume the proposals in question were thoroughly researched and well written). We have not given up on these projects at Rasmuson. We are moving ahead; albeit, a bit more slowly.

I think it is informative to discuss why these projects have not yet been funded and broaden that into a more general discussion of the relative merits of online data bases versus cd-rom data bases.

Cd-rom, by the way, means Compact Disc-Read Only Memory and is a small disk (4.72 inches in diameter) which can hold around 540 million characters in ASCII (American Standard Code for Information Interchange) code. That's enough space for about 275,000 standard pages (assuming 2,000 characters per page) of storage (Miller, 1987). Often this storage medium is written as CD-ROM. I prefer to keep it in its place by writing it as cd-rom.

### Sea Grant Project

As a Sea Grant institution, the University of Alaska supports a good deal of research related to the fisheries industry and marine life in northern waters. Much of this Sea Grant program work is published as "gray literature." That is, it is not published in refereed journals or in other ways subjected to organized peer review prior to publication. While the research findings and reports do not undergo the established scientific literature scrutiny prior to publishing, there is a great deal of useful information contained in these documents for both lay and scientific communities.

The problem of gray literature is the increasing difficulty for providing access to that material. Substantial portions of government sponsored research is published as gray literature.

The problems faced by the Alaska Sea Grant program with regard to gray literature are similar to problems elsewhere. I will set aside for this discussion the issue of adequate reference tools for researchers and librarians to locate even a portion of the growing gray literature publications. Our focus has been on access to the document, once located. Gray literature printing runs are limited, though not necessarily inexpensive. It is often unlikely that any subsequent printings will appear as copies of a report or study dwindle to a few.

Although it is likely current and future gray publications will exist somewhere in an electronic format, there exists a

large body for which there is only a print version. As copies become scarce, chances of locating the document become more difficult. Furthermore, even electronic versions of current publications may not be organized in any systematic way.

Converting and storing the publications on cd-rom would provide a permanent archive that could be searched by key word or phrase. Every publication produced by the Alaska Sea Grant program, about 26,000 pages of published text to date, can easily be stored on one compact disc. Although a standard cd-rom can hold in the neighborhood of 275,000 pages, that is an estimate for text-only pages. Most of the Sea Grant material includes graphics and photographs which require much more memory (around 1 Mbyte for one full page picture). Also to be included in memory on the cd-rom would be search software for accessing the information on the disk. Copies of the disc are inexpensive enough to produce so that distribution to libraries and research centers would be possible. Other Sea Grant programs would receive the first copies.

The objectives of this project, as presented to the national Sea Grant program for possible funding as one mission of the Alaska College Sea Grant program were to:

- 1) convert existing Alaska Sea Grant publications into ASCII and bit map files using an optical scanner in a joint effort with the Electronic Information Delivery Department of the Rasmuson Library.
- 2) store these files on the University of Alaska computer network.
- 3) test the usefulness of these files by encouraging their use in communities that can access them through telecommunication particularly those communities with Marine Advisory Program offices.
- 4) prepare for transferring storage of the information to cd-rom.
- 5) evaluate the cd-rom capabilities of major academic libraries in the Pacific region and in the federal library system with the idea of developing similar standards and practices.

The purpose of placing the material on the University of Alaska computer network was for initial archiving. The stored files would not be in a form suitable for direct searching; although, that is one possibility for future access. Throughout Alaska are Marine Advisory Program offices, providing information to the public and private sectors concerned with marine issues.

bibliographic format and terminology in such works are in need of revision, a new printed edition is both difficult and expensive.

A prime example of this problem is the 16 volume Arctic Bibliography prepared by the Arctic Institute of North America.

The Arctic Bibliography represents a major collection of international sources of information concerned with the Arctic. There is no combined index of the volumes. Currently a researcher must go through the index for each volume. Some citations of an earlier publication were placed in a later volume. Thus, while most works of a certain period may be in, say, volume 5, citations for some works from the same period may appear in a later volume. With no comprehensive index, searching the bibliography in its current form is labor intensive and makes it easy for a researcher to miss a relevant citation completely.

Much of the terminology used, particularly in earlier volumes, is not in step with today's terminology. For example, ethnographic labels used in the index are too limited for current research use. Eskimo is used generically in reference to a large and diverse group of Arctic peoples with distinct and, today, recognized subgroups. A researcher, for instance, looking for information on Inuit peoples would not find that term in the Arctic Bibliography index.

Because of the difficulties in searching through the bibliography and the fact that the last volume was published in 1975, access and use of this valuable research resource is not as great as it could be. Further, there exists a "17th" volume consisting of material collected but never published. This currently exists only on typed index cards--over 6,700 entries--and has never been published in any format.

In 1978 the Arctic Science and Technology Information System (ASTIS) was begun by the Arctic Institute of North America as an online data base containing an index of documents published since 1978. The earlier Arctic Bibliography, which totals more than 23,000 pages of 108,723 citations with abstracts, has never been added to ASTIS or any other data base.

For the Arctic researcher the Arctic Bibliography and ASTIS are the only indexes which provide geographic specificity to a variety of broad subjects. Other bibliographies and indexes may, for instance, indicate materials available on salmon fisheries, but will not restrict listed references to specific geographic boundaries.

Our plan is to convert this comprehensive research collection into a format more readily accessible to today's

researchers by converting it to an electronic format, combining indexes for each volume, and evaluating and updating terminology used in the bibliography.

The result will be an Arctic Bibliography available in a full text, computer readable format which combines the indexes of all volumes and maintains consistent terminology in line with current usage. The effect of this conversion will be to open up access to the sources cited and abstracted in the bibliography to existing and new groups of Arctic researchers.

The final data base will be made available through ASTIS and a later determination will be made of the most appropriate electronic storage formats to be used for future dissemination of the bibliography. We favor storage on cd-rom because of the compact size and durability of the medium, it's ability to contain the entire bibliography on one disc, and the rapidly expanding availability of cd-rom readers in libraries.

The resulting product will have at least four distinct advantages over the current printed Arctic Bibliography. They are:

1. Comprehensive index
2. Rapid searching capability of entire bibliography
3. Standard terminology
4. Distribution of electronic format possible to larger group of Institutions

A decision will be made at the conclusion of the initial stage of the project for the most suitable methods of distribution of the converted data base. To lock into a specific distribution format at this moment may prove too limiting. Ten years ago a new printed version would have been appropriate. Five years ago a microform product may have been desirable. Once the bibliography is in a machine readable form with indexes combined and terminology standardized, the major portion of work will have been completed for any distribution plan.

Our intent is to distribute an electronic version of the bibliography for local storage and use. The potential for distribution of data bases on cd-rom hold the promise of making such information available to smaller institutions and research facilities. Local storage of a data base can represent considerable cost savings when compared to online searching charges.

Our initial proposal for the Arctic Bibliography conversion went to the National Science Foundation. That proposal, which included conversion and data preparation, but not final mastering

into more and more of an electronic environment. Michael Buckland, Professor in the School of Library and Information Studies at the University of California, Berkeley, notes that "...we should expect and plan for the nationwide preoccupation with the retrospective conversion of catalog records to be followed by a second wave of retrospective conversion of the contents of the catalogued objects." (1988, p. 122)

Let me set aside for this paper the enormous problems in copyright posed by electronic conversion. This area is one where, once again, technology has outstripped current law. Nevertheless, there are materials for which copyright is not a major issue in the area of conversion. In both projects discussed in this paper, copyright permission for conversion has been granted.

We came to the conclusion that the time was right to seriously explore the possibilities of large scale conversion of print to digital and creation of data bases from the resulting files. This may be an avenue toward solving access to present and future gray literature. It may also provide an answer for access to archival material which heretofore has only been available at the physical point of storage. Finally, such conversion and creation may provide better access to frequently used reference works such as the Arctic Bibliography.

There is ample evidence of the value of machine readable bibliographic data bases available online to staff and public. Indeed, a major preoccupation of many academic and research libraries for a number of years has been (is and will be) conversion of bibliographic records to machine readable format. Increasingly these data bases are also becoming available as a cd-rom product.

The real question then becomes not do we make materials available in a digital format, but how should we make them digitally available--online or in a local storage cd-rom product?

#### Online and Cd-rom: A Comparison

Let me make clear I have no bias for either online or cd-rom as a superior way to go, despite the fact that this paper discusses two projects that heavily considered cd-rom as a final product. Those decisions were based on what seemed best for each set of circumstances. Online and cd-rom are not mutually exclusive. Indeed, within a few years we may see cd-rom data bases connected to online systems. Already two vendors have come out with software that permits cd-roms to be included on local area networks. In this paper I am looking at cd-rom primarily as a local storage device, though network applications are already

It is a mistake as a user or provider of data bases to focus exclusively on either online or local storage (current cd-rom). It depends on the application which format is better.

From a user perspective a good starting point is frequency of use of the data base. Increasingly vendors are offering both online and cd-rom versions of a data base. As Table 1 points out, a simple cost analysis can indicate whether online or cd-rom will be least expensive, based on use of the data base in question.

Table 1. Cost comparison between using cd-rom data base and their online counterparts

Data base	Cost of cd-rom	Hourly cost on Dialog	Breakeven point <sup>1</sup> (hrs)
Electronic Encyclopedia	\$1495 <sup>2</sup>	\$45	33.2
Compact Disclosure	4500 <sup>3</sup>	45	100
Medline	1475 <sup>3</sup>	36	41
Life Sciences	1475 <sup>3</sup>	87	17
Aquatic Sciences and Fisheries (Cambridge Abstracts)	2250 <sup>3</sup>	87	25.9

<sup>1</sup>Hours of on-line time that would equal cost of cd-rom

<sup>2</sup>Includes purchase of CD reader

<sup>3</sup>Includes yearly updates and rental of CD reader

SOURCE: Reed McManus. (1986) cd-rom: The little leviathan. PC World 10, no.4:272-280.

Keep in mind the cost of a cd-rom may not be a one-time-only expense. If the data base is constantly changing--such as bibliographic records--updates are needed on a regular basis. For some cd-rom products there is a subscription fee to stay current.

There are also ways to share access to cd-rom resources. There is currently a project in the state of Illinois among

## Four Considerations

With any information technology what is new today may, and usually is, old in six months. This is not to put fear in your hearts against purchasing things today, but to keep in mind that there may be a solution to a problem within a year where none existed today. For example, there is available an optical disc product that allows you to write data directly to the disc--once. Called Write-Once-Read-Many-Times (or WORM, one of my least favorite acronyms), these machines are available for around \$3,500. This would allow you to create and master your data base. Perfect for in-house use, but keep in mind a WORM currently is not compatible with any of the cd-rom products. Distribution then becomes a problem.

In many situations it may be advisable to start with a small in-house project and let it grow naturally. Thus, an online data base may start as something available on a local area network and, only as demand increases, does it expand outside your institution. Such small scale development not only saves time, it allows you to work out the inevitable bugs before going to a large public and looking incompetent.

Here are four general considerations to keep in mind as you enter and explore the mysterious forest of online and cd-rom data bases.

### 1. Stay Current

Once your needs are clearly defined, stay current on the technological tools that may answer those needs. The two reasons the projects described in this paper failed to receive initial funding were valid--1) the technology is too new, and 2) the total cost is prohibitive. The situation in both of those cases has already changed since the proposals were written. Cd-rom is quickly moving toward a standard. The cost of data base creation and cd-rom mastering is dropping.

### 2. Start Conversion Now

If it appears that you have large amounts of printed information that users need frequent and detailed access to in an efficient manner and a data base is looming in your future, explore beginning to convert now. It is a slow, rather tedious process. If you begin now, you will be better prepared when the time to create the data base comes. Otherwise you may be under pressure to convert quickly and errors will occur. Wherever possible try to archive documents already in machine readable form. ASCII or character recognition conversion is fairly easy and obtainable.

These offices might be able to economically access an online data base on the University of Alaska computer network.

Even though the project called for further evaluation of cd-rom technology as a storage medium, it was not funded as a project for the current year (1989). A primary reason it was not funded was because reviewers felt cd-rom is not yet a mature technology and there is a lack of standards for optical storage.

You can not guarantee that a cd-rom will work on any cd-rom player. This is not unlike the situation with floppy disks for microcomputers. Unless the floppy disk has data recorded in a format acceptable to a particular microcomputer operating system, the data can't be accessed or "read" by the computer. Fortunately, in the world of microcomputers, the variety of standard formats is down to a few. Programs exist to convert from one format to another. The same is not yet true of cd-rom.

This type of activity (conversion of print material and storage on optical disc with full-text access) is not without company in the library world. Since about 1985 the National Agricultural Library located in Washington D.C. has been involved in a project to develop a data base stored on videodisc that provides access to both textual and graphic material (Andre, 1986).

The Sea Grant proposal did receive good comments, indicating possible success in a future year.

### Arctic Bibliography

There is a widening gap in access to research material between newer electronic data bases and older printed sources. Printed indexes and bibliographies unavailable in an electronic format are becoming less accessible and less used. This is particularly true for printed material that is not current, though still relevant for many research purposes. The usefulness of older material is limited by a lack of standard terminology, irregular transliteration of foreign words and division of subject matter into different categories than those used today. Although these differences may also surface between different online data bases, the amount of variance is much less than among older print-only reference material. Further, information in machine readable form is much easier to edit than its paper and print counterpart. The result is that online data bases will continue to refresh themselves while older print-only materials become increasingly less useful as research tools.

The tragedy is that the information contained in print-only reference works is still of value to researchers. Because the

on a cd-rom, was favorably received. However, we were informed our budget (around \$225,000 U.S.) exceeded the total amount available for projects in that program area for the National Science Foundation for that year.

We withdrew our proposal and are rethinking how to approach funding for this undertaking. We are still committed to a conversion of the Arctic Bibliography.

We don't believe, in spite of Alaskan labor costs, that our budget was inflated. We have been told by some it was too modest for the work to be done. The significant thing to be learned here is that creating a data base--on cd-rom, online, or otherwise--is an expensive undertaking. Conversion and data preparation may be the most expensive aspects.

### Background to Data Base Creation

How the Rasmuson Library/Media Program arrived at this point of proposing to create data bases which would reside on cd-rom is not, I think, unusual in the quickly evolving world of libraries and information science.

Since 1986 we have been involved in a demonstration of full text conversion for rapid delivery of interlibrary loan materials. That demonstration came to a conclusion June 30, 1988. Along the way we learned a few things.

We learned that conversion of text into a computer file that is searchable (by key word, key phrase, and so forth) is too slow and expensive to be regularly useful for rapid document delivery. We used (and continue to use) the state of the art in text conversion (a Kurzweil 4000 system). Yet even that was often too slow (2 minutes or more per page) for conversion of many typeset materials. For rapid electronic delivery of short documents telefacsimile still seems the best alternative.

On the other hand, we discovered optical character recognition presented a major cost savings for conversion of long documents, including books. We also discovered a market for such a conversion service among academics, researchers, and the private sector. Once converted to ASCII code, it is very easy to manipulate the text of a document as well as telecommunicate it almost anywhere there is a computer network.

We began to wonder what the sense was of converting a document over and over again when electronic storage in an easy-to-retrieve format was possible. We also realized that there are large amounts of information that exist only in a print format which becomes increasingly cumbersome to deal with as we move

taking place.

The easiest way to present this comparison is to look at the advantages and disadvantages of both online and cd-rom.

Cd-rom advantages include:

1. Enormous capacity on a storage medium small enough to fit in your hand.
2. Ability to store for retrieval both text and graphics. At this writing no cd-rom product has yet been produced which provides both text and graphics on one disc, but there is no technical reason why this cannot be done. Audio and video can also be stored on a cd-rom.
3. Cd-rom is a self-contained database. It allows local storage and access to large data bases.
4. Once the original master has been produced, cd-rom is fairly inexpensive to mass produce.
5. Most cd-rom products are fairly user friendly (i.e. there are on-screen help menus and simple, common language commands)

Cd-rom disadvantages include:

1. It is read only memory. Data cannot be changed, deleted, or added. The only way to update a cd-rom is to produce a new master.
2. The initial cost of mastering a cd-rom can be expensive. In addition to the costly and time consuming task of preparing the data and finding (or programming) the search software, the mastering charge alone can be as high as \$10,000 U.S. These charges vary and are less today than a year or two ago. For instance, 3M Company will master a disc for about \$4,000, and in quantities of 100 produce copies for about \$30 per disc (Miller, 1987).
3. There is still no single cd-rom standard. Discs must be used on compatible hardware. If you buy a cd-rom product with the correct player for reading the disc, there is no guarantee the same player can read a different cd-rom disc. The manufacturers are aware of this problem and are working together to resolve the issue.

4. Until recently, cd-rom presented a self-contained single user unit. Multiple access was not possible. That, as pointed out earlier, is changing.
5. Depending on the structure of the data, searching on cd-rom may not be as fast as searching on magnetic media.

Advantages of online data bases include:

1. The information is usually very current, the most up-to-date information obtainable.
2. An online database is usually comprehensive. Despite the fact that cd-rom has enormous storage capacity, it is a finite capacity. Some online services such as Dialog offer access to many individual data bases as well as combined searching among the data bases.
3. It is relatively easy to update online data bases. Old records can be deleted or changed and new ones added as they become available.
4. An online data base allows multiple users access to the records at the same time.
5. An online database can be accessed from remote locations.

Disadvantages of online data bases include:

1. The cost for searching an online data base may be high, depending on telecommunications costs and charges for access time to a particular data base.
2. The initial cost of preparing data (conversion, editing, and so on) is expensive.
3. Many online data bases do not employ user friendly search commands and may not offer online help, making use of the data base restricted. This is being overcome by the creation of software which acts as an interface or shell between the human user and the command languages of various data bases. Such software packages are now available.
4. Current online databases are text only. Graphic material is not available.
5. Usually each time an online data base is accessed there is a charge.

academic and public libraries using cd-rom. Five of the eleven participating libraries each have a separate cd-rom data base. Requests are funnelled to the appropriate cd-rom library, the information is pulled off the disc and sent via telefacsimile to the requesting library (Fitzwater and Fradkin, 1988). By sharing the resource no single library must bear the total expense for the cd-rom product.

From the individual user's perspective cd-rom may be more friendly. Because a cd-rom must be a self contained package there is usually on-screen help abundant as well as common language commands. Also, the nature of cd-rom--a local storage device with no clock ticking for online charges--allows the user to "browse" through the data base without the fear of building up a large bill. So, it is important to look at who your patrons are (and the size of their budget).

From the information provider's viewpoint there are a different set of questions to ask. The primary one is, "is it worth the expense for us to create a data base (online or cd-rom) for access to this information?" Keep in mind the major expense of data base creation, regardless of the final format, is the data preparation. This is no small undertaking. If the information is only in print form it must be converted and carefully proofread. There may be considerable content work to be done in the area of terminology, transliteration and translations as in the case of the Arctic Bibliography. Data base software must be chosen and the data put in a format compatible with that software. The end user must be considered in creation of the software for ease of access and on-screen help. John Sack, writing from experience with Stanford University's Socrates online library system believes that the user should not need any documentation except what appears on the screen (1986). If you follow this philosophy, and I would advocate it, additional work must be done on the software.

This has only scratched the surface of considerations in creating a data base. If you want to develop a large data base for use outside your own institution you really need to involve a marketing study: who is going to use this thing and pay for that privilege?

A common mistake is to be seduced by the technology and rush off to create a cd-rom without realizing the solution may be much simpler (and less expensive). You need enormous amounts of information to store before a cd-rom is practical. On the other hand, don't shy away from making use of these technologies.

Once in ASCII it is much easier to manipulate the data. Graphics conversion requires more work and much more storage. One caveat: before you do any conversion you need to think through how you want to use the information, what's unique about it, what its characteristics are--in other words plan how the database should be constructed.

3. Use Shared Resources and Existing Networks

Your problem may not be large enough to invest in a cd-rom database, but your problem may be shared among several institutions and together you can share the expense and make full use of existing resources. This works whether you are creating a product or making use of one. We view our Sea Grant project as an initial pilot. A final product could be a cd-rom containing the gray literature of a number of Sea Grant Programs. The Illinois project referred to earlier combines resources to share the expense of several cd-rom data bases.

4. Start Small

A lot of projects that use technology fail because they start immediately with a shot to the moon rather than modestly learning how to fly first. The nay-sayers point at the failure as evidence the technology "does not now and never will work, amen." In fact, the technology may work fine if properly applied and begun on a small scale and allowed to grow.

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# Downloading ASFA CD-ROM for Resource Sharing and Cataloging

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## Abstract

ASFA CD-ROM was bought as a reference tool. It will undoubtedly become a great asset for reference work once some growing pains are overcome. It has also proven to be valuable for verifying interlibrary loan citations. The use of ASFA CD-ROM as a library utility for downloading records to the online catalog is technically feasible, and although useful for monograph analytics, it has been disappointing for cataloging the reprint collection of the Alfred Wegener Institute Library. Reformatting ASFA CD-ROM downloaded documents for the PERSONAL LIBRARIAN (SIRE) retrieval language is simple to perform with the use of two software packages: DATAEASE and IBM PC TEXT 3. Bibliographic data sent to the Scott Polar Research Institute in Cambridge, England can also be altered to meet its format requirements.

## Introduction

The Alfred Wegener Institute for Polar and Marine Research (AWI) was founded in 1981 and consequently the library is still young and small, albeit, well funded for rapid expansion. In January 1986 the Institute for Marine Research in Bremerhaven was merged with the Alfred Wegener Institute, and the libraries were then consolidated upon moving into the new institute building when it was finished in April 1986.

The library collection now contains over 70,000 bibliographic items, of which 12,000 are monographs, 30,000 serial volumes, 30,000 reprints and technical reports, and 1,000 maps and charts.

The yearly budget, beginning in 1987, is 200,000 DM or c. \$100,000 for books, periodical subscriptions, maps and charts, and for binding. At this writing, the staff comprises three full-time librarians and one part-time library assistant.

The IBM PC-AT with 30M Byte hard disks was chosen to be the microcomputer for much of the Institute. At present, the library has three IBM PC-AT3s with hard disks. In addition the Institute has two VAX minicomputers, which also

can be utilized by the library. For the printing of catalog cards and bibliographies, the library has one laser printer and a matrix printer for printing long runs of continuous form catalog cards.

There are four major software packages now being used in the library: DATAEASE, a relational database management system; PERSONAL LIBRARIAN, formerly called SIRE, a retrieval language for the online catalog; and IBM PCTEXT 3 and PCWrite, both word processors.

#### ASFA CD-ROM

The Aquatic Sciences and Fisheries Information System, which produces the ASFIS bibliographic database, is an international information system for the science, technology, and management of marine and freshwater environments. The Food and Agriculture Organization (FAO) of the United Nations, the Intergovernmental Oceanographic Commission (IOC) of Unesco, and the Ocean Economics and Technology Office (OETO) of the United Nations Department of Economic and Social Affairs cooperate together with national input centers for collecting, organizing, and processing information.

This bibliographic database covers the science and technology of the marine and freshwater environments, together with management and conservation of the living and nonliving resources. Major fields indexed relate to biology, ecology, fisheries, oceanography and limnology, technology and engineering, pollution, and socioeconomic and legal aspects.

ASFA is published monthly by Cambridge Scientific Abstracts for the FAO in both printed and machine-readable editions. There are two parts: ASFA-1, for biological sciences and living resources; and ASFA-2, for ocean technology, policy, and non-living resources.

The Compact disc version of the ASFIS database is produced by Cambridge Scientific Abstracts and comprises one CD-ROM backfile for the years 1982 until 1986. A second CD for all of 1987 was finally made available in April 1988. The originally proclaimed intention of quarterly updates has not yet been realized. Compact Cambridge has problems with their delivery schedule. It must be acknowledged that ASFA CD-ROM is not very timely when the complete files for 1987 were not available until April 1988!

The product itself is easy to use and quite simple to learn, both the menu assisted version for non-experienced users, limited to only two word combinations, and the .dot command version for experienced users, which make all variations of nested boolean commands possible. The instructions are clearly written and well presented, and most important for busy librarians and preoccupied scientists, they are concise.

Downloading ASFA files for direct printing or onto a diskette or the hard disk, is easily done with the Compact Cambridge Software. It is simple to keep part of a retrieval, or the entire retrieval, and it is no problem to select scattered documents throughout a retrieval to save together as one file. A very nice feature is that the user may define what fields are to be displayed, and or saved for printing or downloading. It is, however, not possible to alter the order in which the fields, i.e. author, title, source,

etc. are to appear. Of course, one can have all fields printed in full as a system default.

Only one flaw has become apparent during our short use of ASFA CD-ROM. When searching for articles from books or proceeding volumes, only the name of the editor is displayed in the "AU: AUTHOR" field and not the author(s) of the article itself. This has been somewhat irritating, and does account for some confusion and problems when making interlibrary loan orders for articles not in the library. Compact Cambridge has acknowledged this problem, and states that it was well aware of it, but that it has no intention of making any correction of it in the backfiles for 1982-1986. As of April 1988 it is still a problem in the most recent file for 1987.

ASFA CD-ROM was acquired to minimize the cost and labor of going online to an outside vendor for a frequently requested database. It was hoped that researchers would use the ASFA CD-ROM themselves without the assistance of the library staff. This has proven true. Although the library did have the printed version of ASFA, it was felt that the compact disc could offer library users a faster, more thorough, and easy to use service for current awareness. Students could also have a better tool for preparing bibliographies and reading lists for their dissertation and masters theses with the help of ASFA CD-ROM that its capabilities as a library utility became evident. The possibilities were considered for downloading records for the online catalog, and in particular, for creating analytics and cataloging reprints and technical reports. The library also uses ASFA CD-ROM for verification of inter-library lending citations, finding recent addresses of researchers, and as a dictionary for determining common names of species from their Latin taxonomic terms.

The AWI Library and the Scott Polar Research Institute (SPRI) in Cambridge, England are testing the feasibility of exchanging bibliographic data. ASFA CD-ROM is an integral factor in this resource sharing. The AWI Library and the SPRI Library have agreed upon respective lists of periodical titles from which to scan. The supplying library has either the physical periodical itself or a reprint of the articles for the bibliographic records sent. The AWI Library receives records from the SPRI database in the field of glaciology. The SPRI Library is sent in return downloads from ASFA CD-ROM for articles pertaining to Antarctic marine biology. This pilot project in resource sharing began in October 1987. The bibliographic updates are to be sent on a quarterly basis. The data are sent as ASCII files either on a floppy diskette or by electronic mail directly to the Cambridge Computer. At the present the AWI Library is supplying SPRI Library records in SPRI format.

#### DATAEASE

The library was first made aware of DATAEASE at the end of 1985 when the Computing Center informed it that this program had been acquired for use in the Biology Department. We were invited to examine DATAEASE for possible utilization in the library. After some initial testing, it appeared that DATAEASE was indeed a well written database software package that could assist the library in numerous ways. It was also clear that DATAEASE was not a retrieval language that could serve as an online catalog. The library used DATAEASE to create a circulation system, a form to capture bibliographic entries for input to the online catalog, and a reformatting mode which can

alter data for printing catalog cards and bibliographies. DATAEASE limits the size of each database to 60,000 documents. Twenty six databases can be created. The total capacity is limited by the hardware configuration.

It is easy to create protocols using DATAEASE to reformat either DATAEASE captured data, or data originating from other computer systems with completely different formats and field tags. In fact, it is necessary to reformat all cataloging entries made into DATAEASE to make them PERSONAL LIBRARIAN retrieval capable. It is as simple as pressing a key from the menu and then the reformatting is completed. Within the user defined menus it is possible to string together many different steps, calling in additional programs foreign to DATAEASE if necessary, thereby creating batch jobs for involved reformatting that to the user appears as if only one step is involved.

The machine readable records are not captured online with the PERSONAL LIBRARIAN software, but rather, the relational database management software, DATAEASE, has been implemented to create menu driven user defined formats for capturing cataloging information. MARC records are not used as they do not conform to German library cataloging standards, and are much too detailed for the purposes of an institute library. The formats used do reflect German rules of cataloging. DATAEASE was also used to create a circulation system, thereby assisting in retrospective cataloging. Reformatting data for printed card sets, bibliographies, the PERSONAL LIBRARIAN online catalog, and for other computer systems is quite easy and flexible with DATAEASE.

#### DATA FORMATS

The AWI Library has to deal with a variety of bibliographic formats when manipulating data from ASFA CD-ROM for its online catalog or for sending to SPRI for its online catalog. There are three basic download format options for ASFA CD-ROM. The AWI Library has three different format types. For the purposes of resource sharing, the library only has to deal with one format for the SPRI Library.

The ASFA retrieval program offers three download formats: full, bibliographic, and user defined. Of course, the field names and document delimiters are the same for all of these options. As its name implies, full is the complete listing of all document fields (Figure 1).

The bibliographic format suppresses the various subject and controlled vocabulary fields. By using the user defined format, it is possible to select any field one wants for printing or downloading. For the purposes of cataloging and resource sharing, the library always uses the user defined mode.

The library's online catalog is structured by the demands of its retrieval language, PERSONAL LIBRARIAN. The field tag names were chosen by the library by the way they appear is program determined. The hyphens, which precede and follow the field names, are required by the program: -AUTOR- and also the fact that they must appear on a line by themselves (Figure 2).

AU: AUTHOR Clarke-A; Holmes-LJ  
AF: AUTHOR AFFILIATION British Antarct. Surv., NERC, High  
Cross, Madingley Rd., Cambridge CB3 0ET, UK  
TI: TITLE Lipid content and composition of some midwater  
crustaceans from the Southern Ocean.  
SO: SOURCE J. EXP. MAR. BIOL. ECOL., 1986., vol. 104, no.  
1-3, pp. 31-51  
TL: TEXT LANGUAGE ENGLISH AL: ABSTRACT LANGUAGE ENGLISH.  
SD: SUBJECT DESCRIPTORS  
Southern Ocean;lipid  
composition;ecophysiology;latitude;lipids;fatty  
acids;biochemical composition;latitudinal variations BD:  
BIOLOGICAL DESCRIPTORS  
Crustacea  
GD: GEOGRAPHIC DESCRIPTORS  
PS, Antarctic Ocean  
AB: ABSTRACT  
The decapods *Pasiphaea scotiae* (Stebbing), *P. rathbunae*  
(Stebbing), *Petalidium foliaceum* Bate and *Acantheephyra*  
*pelagica* (Risso) and the mysid *Gnathophausia gigas* (W.-Suhm)  
have been sampled from the Southern Ocean. Lipid contents  
were generally very high, 5 to 25% fresh weight in immature  
and male *Pasiphaea scotiae*, 7 to 17% in *Acantheephyra*  
*pelagica* and up to 20% in both *Gnathophausia gigas* and  
*Petalidium foliaceum*. The variation in lipid content and  
composition with sex and season in both *Pasiphaea scotiae*  
and *Acantheephyra pelagica* indicated that the major factor  
influencing lipid storage in these organisms was the pattern  
of food availability, although they would clearly also  
benefit from the associated increased buoyancy.  
High-latitude midwater crustaceans contain much more lipid  
than the same or related species from lower latitudes. This  
parallels the increasing seasonally of production towards  
the poles, indicating that his seasonality influences the  
biology of the underlying mesopelagic community. ABSTRACT.  
CN: CLASSIFICATION NUMBER  
08286; 08422  
ER: ENVIRONMENTAL REGIME  
MARINE

(fig. 1)

-AUTOR- and also the fact that they most appear on a line by  
themselves. (fig. 2)

-AUTOR-  
Clarke-A; Holmes-LJ  
-TITEL-  
Lipid content and composition of some midwater crustaceans  
from the Southern Ocean.  
-JAHR-  
1986  
-IN-  
J. EXP. MAR. BIOL. ECOL., vol. 104, no. 1-3, pp. 31-51  
-DESK-  
Southern Ocean;lipid composition;ecophysiology;latitude;  
lipids;fatty acids;biochemical composition;  
latitudinal variations ; Crustacea ; PS, Antarctic Ocean  
-ABST-  
The decapods *Pasiphaea scotiae* (Stebbing), *P. rathbunae*  
(Stebbing), *Petalidium foliaceum* Bate and *Acantheephyra*  
*pelagica* (Risso) and the mysid *Gnathophausia gigas* (W.-Suhm)  
have been sampled from the Southern Ocean. Lipid contents  
were generally very high, 5 to 25% fresh weight in immature  
and male *Pasiphaea scotiae*, 7 to 17% in *Acantheephyra*  
*pelagica* and up to 20% in both *Gnathophausia gigas* and  
*Petalidium foliaceum*. The variation in lipid content and  
composition with sex and season in both *Pasiphaea scotiae*  
and *Acantheephyra pelagica* indicated that the major factor  
influencing lipid storage in these organisms was the pattern  
of food availability, although they would clearly also  
benefit from the associated increased buoyancy.  
High-latitude midwater crustaceans contain much more lipid  
than the same or related species from lower latitudes. This  
parallels the increasing seasonally of production towards  
the poles, indicating that his seasonality influences the  
biology of the underlying mesopelagic community.  
-STAN-  
123456  
-DOCTYP-  
ZA  
-END-

(fig. 2)

There are three different DATAEASE files with corresponding formats for capturing and maintaining monographs, reprints, and serials titles. The field names for the DATAEASE files are retained in the online catalog, although the order in which they appear is altered. It was decided to have two separate catalogs for books and reprints. At the present there is no access to the periodicals online, or planned, however, all journal titles are in machine readable format.

Our agreement with SPRI at the present is to supply them only with journal articles. The AWI Library is thus concerned with one SPRI data format (Figure 3).

```
$H *art
*a Clarke-A; Holmes-LJ
*t Lipid content and composition of some midwater
  crustaceans from the Southern Ocean.
*j J. EXP. MAR. BIOL. ECOL.
*d 1986
*pt 104(1-3) :31-51
*abs The decapods Pasiphaea scotiae (Stebbing), P. rathbunae
  (Stebbing), Petalidium foliaceum Bate and Acantheephyra
  pelagica (Risso) and the mysid Gnathophausia gigas (W.-Suhm)
  have been sampled from the Southern Ocean. Lipid contents
  were generally very high, 5 to 25% fresh weight in immature
  and male Pasiphaea scotiae, 7 to 17% in Acantheephyra
  pelagica and up to 20% in both Gnathophausia gigas and
  Petalidium foliaceum. The variation in lipid content and
  composition with sex and season in both Pasiphaea scotiae
  and Acantheephyra pelagica indicated that the major factor
  influencing lipid storage in these organisms was the pattern
  of food availability, although they would clearly also
  benefit from the associated increased buoyancy. High-
  latitude midwater crustaceans contain much more lipid than
  the same or related species from lower latitudes. This
  parallels the increasing seasonality of production towards
  the poles, indicating that this seasonality influences the
  biology of the underlying mesopelagic community.
$
```

(fig. 3)

### Record Reformatting

For the creation of monograph analytics, the ASFA CD-ROM is searched for pertinent book titles from the new library acquisitions. The titles in question are mainly symposium or conference proceedings. The contents of these books, that is the article titles, are downloaded. The user defined format is chosen and tagged to produce records with the following fields of information: author, title, source, subject descriptor, biological descriptor, geographic descriptor, other descriptor, and abstract (Figure 4). The downloaded records are an ASCII file either copied to the hard disk or a diskette.

The ASFA CD-ROM generated ASCII file is read into the word processor IBM PCTEXT 3. The field tags are now changed either to "-autor-" for "AU: AUTHOR" or additional ones are added like "-JAHR-" for ".,1987" in the "SO: SOURCE" field. These search and replace manipulations can be programmed into IBM

PCTEXT 3 so that the whole process is automated. After all the fields have been reformatted, the records can be downloaded as another ASCII file for addition to the online catalog or uploading into DATAEASE for further manipulation.

In order to capture reprint titles from ASFA CD-ROM for entry into the online catalog, they must be uploaded to DATAEASE for use in the circulation mode. Reprints can be checked out as if they were book titles. This is, of course, not true of analytics which is why they need not be entered into the DATAEASE circulation system, but rather can be directly uploaded to the reprints database as a monograph analytic.

AU: AUTHOR

Clarke-A; Holmes-LJ

TI: TITLE

Lipid content and composition of some midwater crustaceans from the Southern Ocean.

SO: SOURCE J. EXP. MAR. BIOL. ECOL., 1986., vol. 104, no. 1-3, pp. 31-51

SD: SUBJECT DESCRIPTORS

Southern Ocean;lipid composition;ecophysiology; latitude;lipids;fatty acids;biochemical composition; latitudinal variations

BD: BIOLOGICAL DESCRIPTORS

Crustacea

GD: GEOGRAPHIC DESCRIPTORS

PS, Antarctic Ocean

AB: ABSTRACT

The decapods *Pasiphaea scotiae* (Stebbing), *P. rathbunae* (Stebbing), *Petalidium foliaceum* Bate and *Acanthephyra pelagica* (Risso) and the mysid *Gnathophausia gigas* (W.-Suhm) have been sampled from the Southern Ocean. Lipid contents were generally very high, 5 to 25% fresh weight in immature and male *Pasiphaea scotiae*, 7 to 17% in *Acanthephyra pelagica* and up to 20% in both *Gnathophausia gigas* and *Petalidium foliaceum*. The variation in lipid content and composition with sex and season in both *Pasiphaea scotiae* and *Acanthephyra pelagica* indicated that the major factor influencing lipid storage in these organisms was the pattern of food availability, although they would clearly also benefit from the associated increased buoyancy. High-latitude midwater crustaceans contain much more lipid than the same or related species from lower latitudes. This parallels the increasing seasonality of production towards the poles, indicating that this seasonality influences the biology of the underlying mesopelagic community. ABSTRACT.

(fig. 4)

To catalog reprints using ASFA CD-ROM downloads, a form is created within DATAEASE that is compatible to the field tags of user defined ASFA CD-ROM downloads. Then an outlist protocol is made for this form to restructure and reorder the fields in accordance to the field tags in the input form for reprint entries. Again another outlist protocols is written to alter these latter field tags for the PERSONAL LIBRARIAN database definitions. One of DATAEASE's utility functions enable outside data to be uploaded into the "ASFA CD-ROM" form from which it can then be uploaded with the same utility function

into the "Reprint" form. Here it is important to mention that data transfer within DATAEASE can only be done with field tags and document separators of one character length. When completing the DATAEASE protocols menu for data transfer between, or into forms, the character "#" has been chosen for field tags and "\$" for end of document markers.

After appropriate documents have been selected from ASFA CD-ROM and downloaded into an ASCII file, they are then read into the word processor so that global changes can be made with all the field tags. The end of each document is also denoted with the "\$". "TI: TITLE" is thus converted to "#", and "SO: SOURCE" is converted to "#", etc., and then "\$" is inserted for "AU: AUTHOR" except for the very first document to be uploaded. The DATAEASE created "ASFA CD-ROM" download function will now input the data, reformat it, and proof it for duplicates before adding it to the final "Reprint" form that is used for the circulation system, and for downloading into the online catalog.

There are limits within DATAEASE which do cause some problems. Each field may not exceed to 255 characters, more than adequate except, unfortunately, for abstracts. For the latter, it is then necessary to make arrangements for many different fields of 255 characters each to contain abstract information. Another problem is that all outlistings producing lines longer than 80 characters will break words up with hyphens at nonsyllabic places. This often makes additional editing necessary for printing catalog cards and prior to uploading entries to the online catalog.

For resource sharing with SPRI Library, many of the same steps are used as above. There are a few exceptions. It is not necessary to apply the DATAEASE functions. The appropriate search strategy is used to find the required titles from ASFA CD-ROM. These are then reformatted first with the ASFA user defined formats. In this case the fields: author, title, source, and abstract are chosen and downloaded. This file is now read into the IBM PCTEXT 3 word processor for reformatting. "AU: AUTHOR" becomes "\*a"; "TI: TITLE" becomes "\*t", etc. (figure 3). After the completion of all the global search and replace operations, the file is downloaded as a new ASCII file for transfer via electronic mail or diskette with the postal service to Cambridge, England.

#### Downloading: An Important Utility

The AWI Library maintains a collection of reprints from periodicals that are not part of the library's holding. Since our periodical holdings are most comprehensive and comprise all the core journals devoted exclusively to marine or polar research, the reprints tend to originate from periodicals not necessarily well covered by ASFA. Although our studies are not yet conclusive, less than 80% of the 1985 titles we looked for could be found in the most recent ASFA CD-ROM available to us. The book records found in ASFA CD-ROM are not suitable for monograph cataloging purposes, and again, most of the many non-marine science books acquired by the library are not listed anyway. Searching for items in ASFA does take time, and a 20% hit rate does not seem to merit the effort involved.

The use of ASFA CD-ROM for creating and adding monograph analytics to the online catalog is fast and easy. It is definitely an extra service for

library users which gives greater access to books via their specific content. The necessity of searching an additional source other than the library catalog is obviated. This speeds the search for materials, especially when only immediate resources that are on hand in the library are desired. After all, the online services and ASFA can frustrate users by offering a plethora of materials which the library often does not have in its collection, and must provide from outside through interlibrary lending.

Downloading titles from ASFA CD-ROM does require time despite all the features of automation available. A data typist is still necessary to do much of the work especially for titles not found. Searching for the required titles to match the reprints or monograph analytics we wish to put in our collection, is one major time consuming factor.

### Conclusions

We conclude that downloading databases and reformatting the documents for other computer systems, or for printing catalog cards is, with the assistance of DATAEASE and IBM PCTEXT 3, easy to perform. DATAEASE makes almost all manipulations of data elements practicable, simple to execute, and possible to save for future use. Downloading does not appear, however, to be practical for cataloging the Alfred Wegener Institute Library's backlog of reprints and technical reports. In this study new technology does not solve the problem of a greatly understaffed library. A good typist is still a valuable assist in the modern electronic library. ASFA CD-ROM is a valuable source utility with which it is easy to provide the additional service of adding detailed monograph analytics that utilize extensive ASFA subject headings to the online catalog. Without a doubt ASFA CD-ROM is too valuable a resource not to share with other libraries that do not have access to it. The present computer technology make the transfer of bibliographic data between small institute libraries simple and easy to execute. How worthwhile this exchange of bibliographic cataloging truly is, must still be studied.

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# Pilot Comprehensive Polar Bibliography Using CD-ROM

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Every citation of polar-regions literature ever recorded on an electronic data base can be put on one CD-ROM disk, with room left over. Placed in a \$700 player wired to a personal computer, the CD-ROM gives the researcher unlimited browse time and effective search strategies. It frees the user from the economic pressure to search fast and get off that is imposed by connect charges and telecommunications costs associated with commercial online systems. CD-ROM is especially attractive for remote installations far from online database sites. Bibliographies on CD-ROM are proved products both technically and in the marketplace and can be compiled, with search software, by a variety of vendors.

With this knowledge and a long-standing commitment to provide U.S. Antarctic Program research stations with access to polar literature, the National Science Foundation in 1987 authorized the Library of Congress to create a PC-based CD-ROM (compact disk, read only memory) or WORM (write once, read many times) file containing the 142,000 citations compiled by the Cold Regions Bibliography Project. An identical system will be housed in the Foundation's Polar Information Program in Washington, D.C., for use by staff and visiting scholars.

Two Federal agencies support the Cold Regions Bibliography Project. The U.S. Army Cold Regions Research and Engineering Laboratory supports production of the Bibliography on Cold Regions Science and Technology (110,000 citations, 1950-present). The National Science Foundation supports production of the Antarctic Bibliography (40,000 citations, 1951-present). There is an overlap of about 8,000 titles between the two bibliographies. All the Antarctic citations and some of the cold-regions citations include abstracts. These two bibliographies together are known as COLD by users of the Orbit commercial online database.

In consultation with its sponsors, other polar bibliographers, and vendors, the Library of Congress is now evaluating options for hardware, software, vendors, and distribution method for the CD-ROM pilot project. The objective is to install systems at the U.S. research stations in Antarctica before the next 8-month winter isolation, which begins in February 1989.

The CD-ROM pilot project appears to offer a concrete, visible, and

attractive target for polar-oriented librarians and bibliographers who, as recommended by several groups and reports [1, 2, 3, 4], covet a more effective polar bibliographic system than now exists. As sponsor of the CD-ROM pilot project, the National Science Foundation is eager to cooperate with other polar bibliographers and librarians in order to enhance the visibility, attractiveness, completeness, retrievability, and efficiency of polar bibliographies and to spread the cost appropriately over the producing and benefitting organizations and individuals.

The mere identification of CD-ROM as an attractive vehicle for a comprehensive polar bibliography does not eliminate the need for organizational change as identified specifically and eloquently by many of the speakers at the 12th Northern Libraries Colloquy. Questions of format, overlap, and completeness of coverage certainly will not go away just because technology often drives the course of human affairs, and CD-ROM may soon place comprehensive access to polar literature at the fingertips of every librarian and scientist from Inuvik to the South Pole.

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<sup>1</sup>Measures are needed to protect, enhance, and document archival, museum, library, and documentary sources of scientific data on arctic subjects and to make these data available to users. (1987) United States Arctic Research Plan, Interagency Arctic Research Policy Committee, Report NSF 87-55, National Science Foundation.

<sup>2</sup>A simple means is needed to access the several major bibliographic utilities and through them the larger arctic libraries. (1987) A National Arctic Information Network, Arctic Environmental Information and Data Center, University of Alaska, Anchorage.

<sup>3</sup>The technology of information systems and bibliographic coordination is advancing rapidly . . . An up-to-date, comprehensive and compatible northern and polar science information and communication system cannot be expected to evolve naturally . . . It must be deliberately designed and implemented (1987) Canada and Polar Science, Department of Indian Affairs and Northern Development, Ottawa.

<sup>4</sup>Perhaps most important of all support considerations is ensuring rapid and complete reduction of data, timely publication of scientific results, and the placement of the data in efficient storage and dissemination systems. (1983) Research Emphasis for the U.S. Antarctic Program, National Research Council, Washington, D.C.

# IANI-Intelligent Access to Nordic Information Systems

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## Abstract

IANI (Intelligent access to Nordic Information systems) is an intelligent interface developed for NORDINFO by CRI (Computer Resources International) assisted by BRODD (The Consultancy and Development Department of the Norwegian School for Library and Information Science).

As a result of the first phase of the project, NORDINFO has published a report on "Language requirements for the intelligent interface facility" and has recommended the IANI-Command Language (based on ISO/DP 8777) as standard command language for databases supported by NORDINFO.

The result of the project will be a prototype which will work on computers compatible with IBM-PC/AT. This interface will give access to 3-4 Nordic database hosts with one logon/logoff and search procedure. Later on the intention is to connect most of the Nordic databases to the IANI system.

The user may choose different access levels (menu or command) and will be guided by the system to formulate a correct search statement in CCL (Common Command Language), which will be translated by the interface into host command language.

A metadatabase located partly on the PC and partly on one of the IANI hosts (the global metadatabase) will assist the user in selection of search terms and databases.

The prototype will include simple facilities for document ordering and accounting, which will be expanded in a follow-up project, IANI-II.

## Background and purpose

In 1985 NORDINFO (The Nordic Council for information and research libraries) took the initiative to develop an intelligent interface to Nordic information systems, IANI.

The decision arose from the fact that Nordic databases, often developed with support from NORDINFO, were rarely used to any significant extent by the potential users once they moved from test phase to commercial operation.

As the total usage of the commercially available databases in the Nordic countries did not show any signs of approaching a level matching the actual potential of the databases, it was considered necessary to apply new methods in order to make the online databases more attractive to the users.

When NORDINFO decided to embark on the rather ambitious and costly interface project the organization was aiming at several different goals:

- to produce an attractive interface which would result in increased interest for online databases among the potential users in general and in utilization of the Nordic databases in particular,
- to increase the awareness of online information technology particularly among the small and medium sized enterprises,
- to reinforce use of standards whenever possible for production and interconnection of databases,
- to make the Nordic databases accessible via a standard command language (Common Command Language (CCL)),
- to present a set of guidelines for database production, presentation and use for the Nordic database producers,
- to interconnect Nordic library online catalogues in order to utilize the Nordic library collections as efficiently as possible,
- to apply the most advanced technology for further development of the two central projects of NORDINFO, SCANNET (1) and NOSP (the Nordic catalogue of serial publications) (2).

CRI was contacted and asked if it might be considered feasible to produce an attractive interface which would give easy access to different databases on different hosts.

As a result, CRI worked out a proposal for an interface prototype with a total cost of 2.1 million FMk plus 6 man months for each host to be linked to the interface.

The project was a joint venture between CRI and BRODD (The consultancy and development department of the Norwegian School of Library and Information Science). The financing of the project was shared between NORDINFO and the Nordic Industrial Development Foundation.

A Steering Committee with representatives from each of the Nordic countries was established to follow the project and evaluate the results of the individual project phases.

The project was started in October 1986 and a prototype will be delivered to NORDINFO in June 1988.

#### The IANI concept

The IANI concept includes the following elements:

- one logon/logoff procedure to all databases and hosts,
- access via menu or CCL commands according to user's choice,
- conversion of user statements to correct CCL expressions in the PC,
- help to search formulation and database selection via metadatabase at the PC (possibly with support from a global metadatabase on a host),
- conversion of CCL commands to host language commands at the PC,
- transmission of validated host language commands to the host,
- transfer of search results to PC,
- sorting, merging and editing of results in PC,
- presentation on screen and print in host formats or standard IANI-format,
- document ordering,
- presentation of statistics on session time and costs when the information is available from the host.

The concept is visualized in figure 1.

#### Local metadatabase:

contains host and database descriptions downloaded from host mdb or global mdb.

#### Host metadatabase:

contains host and database descriptions of the individual host.

#### Global metadatabase:

contains all host and database descriptions, keyword indexes not included in the local mdb, central facilities for accounting and document ordering. (Not all facilities will be included in the prototype phase.)

## Key elements

The key elements in the IANI interface concept are:

- A PC with minimum 640 kb memory and hard disk -

The interface is developed on a workstation compatible with IBM PC/AT; it must be portable to other IBM-compatible workstations like Ericsson, Mikro-Mikko (NOKIA), Olivetti M24 and Toshiba portable.

- An efficient screen dialogue using facilities like mouse, windows and graphics -

The interface may be used without access to these facilities, but the efficiency and user-friendliness may in that case not be impressive.

- Access at novice as well as experienced user level (choice of menu or commands) -

- The interface will translate the user statement into a correct IANI-CL statement (subset of ISO-CCL with suggested extensions).

- Conversion to host command language in the PC -

The interface will translate the IANI-CL statement into host command language via a host description table downloaded to the PC from a host during the first session with the specific host.

- Automatic warning or advice functions -

A POP-UP window will appear with warning or advice whenever a user statement will result in a situation recognized as undesirable by the interface. A POP-UP menu will appear, when the system requires a reaction from the user in order to continue the search process.

- Easy linking of new hosts with minimum of effort from the host -

New hosts must implement a file transfer protocol (KERMIT) and provide a host and database description according to guidelines specified by CRI. CRI has developed a prototype for input of this information in order to minimize the work of the host.

- Automatic downloading of host information to the PC at start of session -

When the user first accesses a particular host, the host and database descriptions of that host is downloaded to the PC; updating will occur automatically at the start of later user sessions.

- Help to select search terms and databases through a metadatabase at the PC supported by a global metadatabase on one (or several) hosts -

The metadatabase of the PC will, in the prototype phase, contain database and host descriptions, a simplified UDC classification scheme and keywords from the SCANNET database guide. When this information proves insufficient to guide the user to the relevant database and host or select the appropriate search terms, the global metadatabase will be accessed. The bottleneck in this operation will be the time it may take to access the metadatabase host.

- Access to all types of databases with identical/related search dialogue -

In the prototype phase the majority of the IANI databases will be bibliographic or at least have a command language.

It is, however, the intention as early as possible to add relational databases to IANI in order to obtain the nearest possible similarity in the user access to factual and textual databases.

- Access to non-IANI hosts through a transparent facility -

The IANI-logon facility may be used for non-IANI databases, but the actual search will have to be performed in the host's search language; the IANI help functions cannot be used during the search session.

- Easy portability of software -

The interface is programmed in C in order to obtain maximum portability to other types of hardware. It is intended to demonstrate portability to mini- or main-frame computers operating in a network in the next phase of the IANI project (IANI-II).

- Use of AI techniques (object oriented, rule based system) -

The "intelligence" in the interface will, in the prototype phase, consist of the following elements: an object oriented, rule based system, user support in formulation of search statements and selection of search terms, databases and hosts and a user modelling facility for collection of knowledge about the user behavior during the search session.

- Automatic logging of user dialogue -

The interface will store the user statement for search on different databases and hosts, for later updates and modification. The search statement may be sent in lines, segments or in total.

Search results may be sorted, edited and formatted in different host formats or IANI-format.

## Use of IANI in practice

In June 1988 the IANI prototype will be delivered to NORDINFO, which will make the interface available to all public BDI-institutions in the Nordic countries on request.

The prototype will be delivered as a "package" consisting of a diskette with instructions about the installation of the software on the PC, an IANI password and a user guide. So far it is assumed that the user is responsible for obtaining the necessary passwords to host and networks.

During the first session with a host, the relevant host and database descriptions are downloaded on the PC. Changes in host descriptions will automatically be downloaded during following user sessions.

Non-IANI hosts may be accessed according to the standard procedures of the individual hosts.

The metadatabase will help to select the database. Since the metadatabase from the start will contain database descriptions on Nordic databases, which are not included in IANI in the prototype phase, the metadatabase may direct the user to either a database or a host, which must be accessed through the transparent facility.

Since the user may not hold a password to all hosts, the interface will tell the user how to get a password via phone, post or electronic mail.

If the user needs to access several hosts during the session, the user may route the search profile to a second or third host. It was considered to let the interface perform this operation automatically, but since the network may cause transmission problems, it was concluded that an automatic function of this kind may operate too slowly to be really attractive at this time.

If a search session results in output from several hosts, the interface will contain a facility for sorting and editing provided that the output from the different hosts is received in convertible output formats.

The prototype contains facilities for accounting and statistics to the extent such facilities exist on the hosts. In IANI-II it is intended to expand this function with facilities for detailed statistics on use of specific databases by individual local users.

An important facility in the prototype will be the document ordering facility which will enable the user to order documents through a mailbox facility to the extent that the hosts will be willing to support this function. Since the document delivery function in this phase will be a standard mailbox facility, the user may order documents from all hosts who are willing to open the mailbox and deliver the document. This means that the system does not require the presence of an operational online ordering system at the host. It is, however, the intention to link the interface to operational online ordering systems, as soon as such facilities are available on IANI hosts.

The further development of IANI as a tool in the information resources management of public institutions or private companies is considered part of the strategic business planning of CRI, where the IANI concept along with other CRI products (e.g., knowledge based form filling, time scheduling, auditing and support systems for decision making at different levels) may be combined to produce a package specifically adapted to the needs of the individual company/institution.

#### IANI organization and future plans

The IANI package will, in the prototype phase, act as a support to the individual user, who will receive help for many of the cumbersome, non-standardized routine functions of a search session; but the user will, to a large extent, retain the responsibility and the trouble of acquisition of passwords and paying of bills to several different hosts.

It will initially provide help to access a set of databases on the 3-4 IANI hosts consisting of:

- \* ALBA, literature in Danish research libraries,
- \* LIBRIS, literature in Danish research libraries,
- \* FINLEX, subsets of the Finnish legal databases.

Other databases on the same hosts may be available as well.

The hosts mentioned have been selected in order to have representation from different countries, different types of databases (bibliographic, factual and full-text) and to have information on a broad spectrum of different subjects available to the user from the start.

Other hosts may join the IANI system at the cost of the manpower required for the conversion of the language to the host command language. This will generally correspond to 2-3 man months unless the host description is very similar to an existing host description. If the database does not have a command language it may be more costly.

In order to save the user the trouble of contacting many different hosts, it might be practical if either NORDINFO or CRI made contacts to hosts who might be contacted through the transparent facility.

However, since access to a number of different databases today is possible through several channels, it might be preferable for either NORDINFO or CRI to contact, e.g., Teledata in Denmark, GEONET in Germany or EASYNET in the US and investigate the possibilities of obtaining reasonable cooperation arrangements.

Teledata, GEONET and EASYNET today all offer access, central accounting and help in database selection, whereas they do not have facilities for search formulation help, language conversion, document ordering, user modelling or an advanced screen dialogue.

A combination of the network gateway facilities with the IANI interface might result in a high degree of user friendliness, and attempts will be made to make arrangements for cooperation with organizations responsible for

operational gateway systems.

IANI is the most expensive NORDINFO project to date. It may be considered as a follow up of the ambitious SCANNET project started as a physical packet switching network in 1977, and IANI, further, includes the intentions behind the NOSP-project (Nordic catalogue of serial publications). IANI may be an important element in future Nordic coordination of efforts in information and communication, and it can, therefore, be anticipated that NORDINFO will establish a permanent infrastructure around the continuation and future development of IANI.

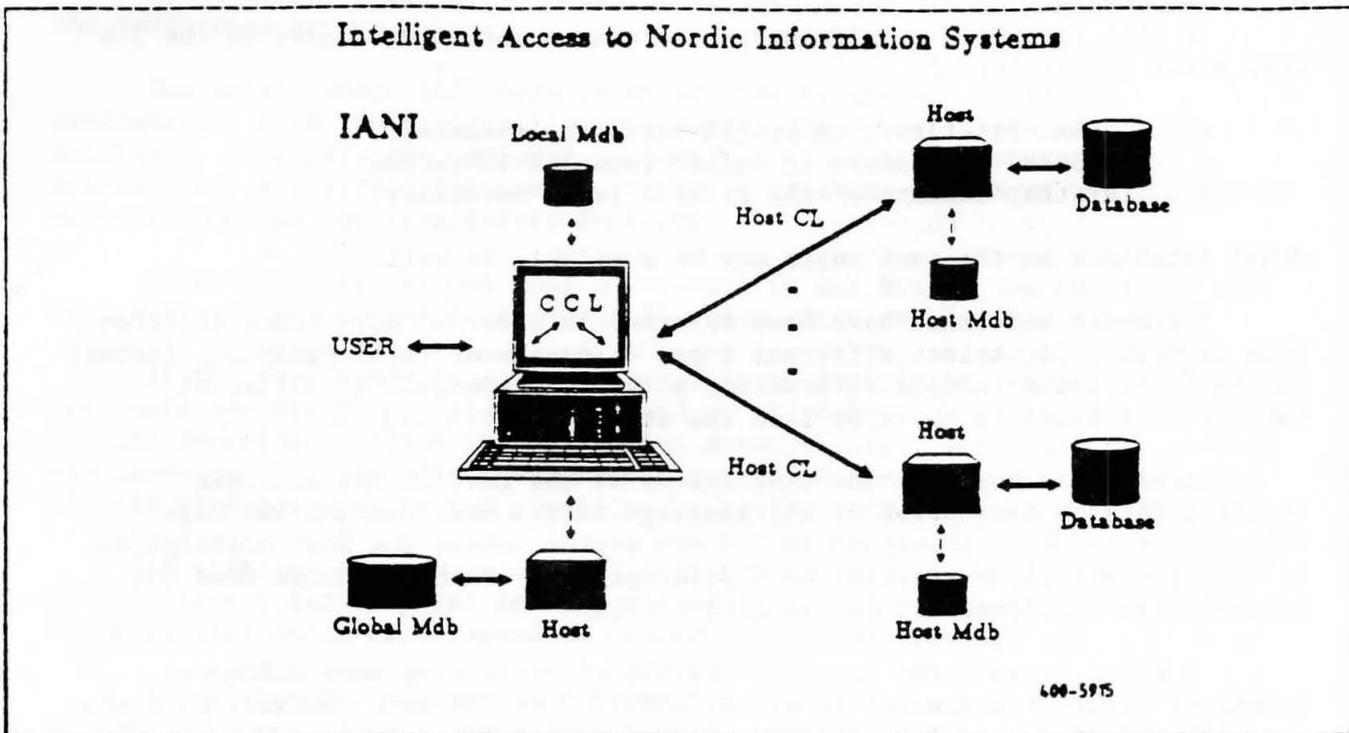


Figure 1.

# World Data Centre "C" for Glaciology: Past, Present and Future

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## Abstract

The historical role of the World Data Centre 'C' for Glaciology is reviewed, and its present mode of operation within the Library of the Scott Polar Research Institute, University of Cambridge, is illustrated. Future developments, especially in the European context, are suggested. It is shown that, over the past few years, the dissemination of information, often to commercial organizations as well as to academic institutions, has become the primary function of WDC-C.

## Historical background and organization of the World Data Centres

The World Data Centres came into existence as a result of the International Geophysical Year (IGY) of 1957-58. Their purpose was to ensure that observational data from the IGY programme would be readily available to scientific workers in all countries. The arrangement became permanent under the auspices of the International Council of Scientific Unions (ICSU) and has remained so to the present time.

Each World Data Centre (WDC) comprises a number of separate discipline centres, often separated geographically. The centres of WDC-A are in the USA and of WDC-B in the USSR, while those of WDC-C are mainly in western Europe and Japan. As well as glaciology, other subjects covered by the centres are terrestrial physics, rockets and satellites, meteorology, oceanography, and solid-earth geophysics. The triplication of the WDCs was intended as a safeguard against destruction and to facilitate the exchange of information. Further details of the concept and organization of the WDCs will be found in the first part of the *Guide to the World Data Center System* (Shapley and others, 1987).

## Present activities of World Data Centre 'C' for Glaciology

Glaciology may be defined as the study of past and present snow and ice in all their forms and in all situations. Thus, WDC-C for Glaciology includes in its sphere of interest:

- land and sea ice
- snow in the air and on the ground
- avalanches
- glaciohydrology
- glacial geology and the ice ages
- glacioclimatology
- periglacial phenomena
- permafrost
- frozen-ground engineering
- snow and ice engineering
- glacioastronomy
- ice physics.

WDC-C for Glaciology is western Europe's primary resource and referral centre for ice and snow information. The Centre is located at the Scott Polar Research Institute, which is a department of the University of Cambridge, in Cambridge, England. It is funded by the Royal Society, a non-governmental organization which has existed to promote the general advancement of science since 1645. Additional support is provided by the University of Cambridge, and the Manager of WDC-C for Glaciology is further assisted by the provision of equipment and support staff from the SPRI Library and Information Service.

The services provided by WDC-C for Glaciology focus on the index to published information which contains references to:

- 4,000 published monographs and technical reports
- papers published in over 100 periodical titles
- 6,000 reprints from additional publications .

The collection is supplemented by sea-ice charts, land-ice and glacial geologic maps, reports of snow surveys, slides, photographs, films, theses, and unpublished material (mainly historical). These are world-wide in coverage, not solely polar.

Until 1984, publications were indexed in a card catalogue by subject, region, and author headings. Since 1985, publication records have been incorporated in the SPRI LIB database and are retrievable by author, title, subject, region, and date of publication. It is the intention of WDC-C for Glaciology to transfer the card references into the database within the next few years. When this task is completed, the glaciological information index will be made available to other institutions on microfiche, magnetic tape, or CD-ROM, as required.

Products created directly from the information index include *Glaciological Citations*, a monthly bulletin of new accessions which is available either on subscription or in exchange for relevant publications from other institutions. Individual researchers may subscribe to the personal current awareness service which alerts the glaciologist to new

publications in his or her special subject field. Both of these services are charged on a cost recovery basis rather than a full commercial scale and so provide an extremely cost-effective way of keeping up-to-date with the literature.

*Radio echo-sounding as a glaciological technique* is the first of a new series of annotated bibliographies to be produced from the SPRILIB database. Compiled by the WDC-C for Glaciology, this publication complements the pioneering work of the SPRI Radio Echo-Sounding Group from the early 1960s to 1987.

Traditionally, users of WDC-C for Glaciology have been Cambridge-based glaciologists and visiting academics, but in recent years the services of the Centre have been more widely advertised and enquiries are now received from people in government departments, media organizations, commerce, and industry, in addition to university researchers. This promotional activity has also drawn enquiries from commercial library information services which contract out their most specialized enquiries to expert sources.

Routine enquiries may be made by personal visitors, by letter or via the telephone. The answer to these enquiries may be located within the resources of WDC-C for Glaciology or the SPRI Library, or may be retrieved from other specialist sources. There is considerable cooperation between the Centre and three other Cambridge-based organizations, the British Antarctic Survey, the Scientific Committee for Antarctic Research, and the International Glaciological Society. Routine searches for glaciological information are made regularly at other Cambridge libraries, particularly the University Library and the departmental libraries of Earth Sciences, Geography, Applied Mathematics and Theoretical Physics, and Engineering. In addition, a number of new personal contacts have been made within the "hi-tech" companies which are located in the Cambridge Science Park, when requests for assistance from them have led to a regular two-way exchange of information.

Another recent activity in library cooperation has been the participation of WDC-C for Glaciology in the SPRI Library's collaborative cataloguing project. In the preliminary test run, catalogue records from the Data Centre are exchanged with others from the Alfred Wegener Institute in Bremerhaven and the British Antarctic Survey.

#### Future activities of World Data Centre 'C' for Glaciology

Promotional efforts are planned to extend the market for information products and services into mainland Europe. This will be achieved by advertising, either directly by mail or indirectly by attending information conferences, and by developing personal contacts with the many visiting scientists to the SPRI Library.

Further developments will include improving document delivery services by utilizing facsimile systems and receiving and responding to distant enquirers by electronic mail. It is hoped that both these facilities will be available before 1989. It is also hoped to extend

the SPRI collaborative cataloguing project by increasing the number of partners who are willing to participate in the exchange of records with WDC-C for Glaciology.

In these ways, WDC-C for Glaciology will maintain its goal as a truly international service for the dissemination of glaciological information.

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# Research into the Biology of Northern Regions at the University of Oulu, Finland

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## Abstract

The University of Oulu is located in the middle boreal zone of northern Europe, 65 N, 25.5 E, and its biological departments, those of Botany, Zoology and Genetics, inevitably give priority to the study of topics connected with the natural environment in the north. This work varies greatly in content, comprising pure descriptive research concerned with the biosphere, the flora and fauna and its ecology, ecophysiology, wintering ecology and physiology, nature conservation, and particularly air pollution and its effects, and topics relevant to biotechnology. The work is carried out both on the premises of the university itself and at a variety of research stations.

## Vegetation, flora and fauna

Numerous pieces of research have been published on the structure of the natural or near natural vegetation of the forests, mires, shores, waterways, rocks and mountain tops of the region, its flora, ecology and Quaternary botany. The rapid rate of land uplift on the coast of the northern Gulf of Bothnia, 0.9 mm/yr, creates particularly favourable conditions for studying the vegetational succession. Both traditional floristic approaches and modern multivariant numerical methods have been used for the purposes of vegetational research. Among the individual groups of organisms whose distribution and ecology have been studied, particular mention should be made of vascular plants (especially threatened species), macrofungi, fish and insects. The relation between productivity in the vegetation and the populations of small rodents on the fjelds of Lapland has formed the topic for one recent doctoral thesis.

Finnish research into the great predators, the wolf, bear, etc., has a firm international reputation, and interest has spread in recent times to the wild forest reindeer, *Rangifer tarandus fennicus*, and its migrations in the region of the Finnish Soviet border, including the use of 'spy reindeer' with radio transmitters attached to them whose movements across the border can be traced with the appropriate receivers.

## Wintering ecology

Frost, snow and ice play a prominent part in the overwintering of plants and animals. Both field and laboratory tests have been carried out

on the cold resistance of economic forest plants such as certain tree species and the berry bearing dwarf shrubs, and annual observations on the winter survival of various decorative plants have been made at the University Botanical Gardens for many years. The annual physiological rhythm of the Scots pine, *Pinus sylvestris*, at the level of its cell biology is a further major topic of research, including an investigation into the invasions governing its sexual reproduction. Similarly a broad spectrum of investigations have been conducted into the winter ecology of wildfowl and other game species, including the physiological speciality of their overwintering processes, their mechanisms of thermoregulation.

### Genetics

The main theme of research in the field of genetics is again concentrated on conditions in northerly areas. This may be summed up briefly under the heading of 'speciation and genetic adaptation in the *Drosophila* of the boreal forest zone'. The work has so far led to the discovery of 30 *Drosophila* species.

### Biotechnology

Modern biotechnological research at the University of Oulu commenced with the establishment of a fairly large research group working intensively on the tissue culture of *Pinus sylvestris*. It is hoped that this can offer a solution to the problem of pine seedling production in Northern Finland, where good seed years for pine are rare. Experiments are also under way with other tree species.

### Effects of air pollution

Intensive research has been carried out for about twenty years into the destructive and stressful effects of acid rain on the lives of the forest trees, the area to which this research applies covering for practical purposes virtually the whole of Finland. Lichens have also been used as indicators of air pollution in the customary manner. Changes in the populations of invertebrates have been studied in tree damage areas. The occurrence of certain environmental pollutants has also been monitored in water creatures, e.g. that of PCB compounds in the seals of the northern Gulf of Bothnia.

### Publications and library

The above makes mention of only the main themes of biological research at the University of Oulu, but the bibliographies of the departments concerned contain many hundreds of publications from the present decade alone which are available to anyone interested. There are also several hundred degree dissertations by students at these departments available at the library in manuscript form.

A good library is an essential for successful scientific work and study, and the Biology Library offers a good service in this respect. It contains around 41.000 volumes of books and reprints and subscribes to approx. 700 journals. It also has its own Information Service which provides the research staff with literature references from data banks such as ESA, DIALOG, ADAMIS, QL and MINTTU. The majority of the searches, 75%, are directed to the BIOSIS PREVIEWS data base.

Bibliographies (on display at the Colloquy)

List of publications, Department of Botany, University of Oulu, 1980-1986. Distributed by the Biological Library. Oulu (1987), 22 pp.

List of publications, Department of Zoology, Univeristy of Oulu, 1981-1987. Oulu (1988), 45 pp.

List of Publications, Department of Genetics, University of Oulu, 1981- 1986. Oulu (1988), 10 pp.

# **A Study of Overlap Between Geographically Oriented Databases and Subject Oriented Databases**

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## Introduction

The broad question of the "strength" of northern databases vis-à-vis subject databases has been asked numerous times by individuals who deal with northern information and literature. This particular study is the result of a conversation the authors had with Martha Andrews at the NOIR Workshop held in Edmonton, Alberta in 1986. It is a study aimed at determining how well northern databases cover northern literature and how well subject-oriented databases cover the same literature. Specifically, it is a study of the overlap between northern databases and subject-oriented databases when searching for specific topics.

## Methodology

This study is a user driven study. Rather than searching for specific items to determine how well the core literature is covered in each database, specific research topics were identified and databases were searched for relevant material.

Five researchers, four of whom were affiliated with the Boreal Institute for Northern Studies, University of Alberta and one affiliated with C-FER (Centre for Frontier Engineering Research), University of Alberta, were asked to participate. Since we were interested in examining both science and social science subject databases, three science and two social science oriented researchers were selected. The general areas of interest of these researchers were fish, forest fires, engineering, political science, and clothing and textiles. All the researchers approached were extremely cooperative.

Extensive reference interviews were conducted with each researcher. A social science librarian was included in the interviews with the social science researchers. These interview questions resulted in thirteen questions. The questions varied not only in subject but also in nature.

Some of the questions related to research currently being conducted by the participants, and thus were in areas in which the participants already possessed considerable expertise. Some questions related to areas in which the participants had not done any previous research and some questions related to current events.

Following the interviews, the authors formulated the search strategies together in order to ensure consistency. Various database vendors were contacted and free search time was received on Dialog, Orbit, QL and Infoglobe. The subject databases were chosen on the recommendation of a subject librarian and through a review of Cuadra's Directory of Online Databases. In total, 44 databases on 7 systems were searched, all of which were North American based. The searching was divided so that one author searched all the subject databases and the other author searched primarily the northern databases.

Searching such a wide variety of systems was difficult even with the use of OneSearch on Dialog and search save. OneSearch is a new feature which allows the user to search a number of different databases at once. While this is very attractive, OneSearch requires the user to know well all the databases being searched in order to anticipate retrieval and to plan the search strategy carefully. Otherwise, numerous irrelevant references are retrieved. In some ways, OneSearch is similar to batch searching. The point which needs to be emphasized is that it is very difficult to search databases well if the searcher is not extremely familiar with them and a great many of us are in situations where it is impossible to be sufficiently familiar with all appropriate databases.

The retrieved records were downloaded to the University of Alberta mainframe computer using Dialog 4 format whenever possible. Some databases do not have a downloading format and some systems do not even have field tags included in the records. This made work undertaken later on even more difficult.

The downloaded records were edited and used to create another database using the SPIRES database management system. This database was created partly to allow easy alphabetization of the results in order to help the researcher identify duplicates and partly to assist in the manipulation of data for statistical purposes. Ultimately, the database contained approximately 6000 records. It took approximately 200 hours or 2 minutes per record to edit the files.

Once the database was created, printouts were generated for each search question. The format of each record was modified to eliminate any elements which would easily identify the database from which the record was retrieved. This was done in an attempt to avoid any obvious biasing of results by researchers.

The researchers were given the printouts related to their question(s) and were asked to rank each citation according to relevancy. Four categories were defined:

- \* New and wonderful (citation was new to the researcher and useful);
- R Relevant;
- ? Can't tell whether the result is useful or not based on the information given;
- N Irrelevant.

The researchers marked up the printouts and returned them. For the purposes of this paper, a preliminary analysis of two of the searches was undertaken. One search, or question, related to the biology of freshwater fish in northern areas -- particularly age, growth, reproduction, food and diet. The other search was about climate change and its relationship to forest fires in boreal and tundra areas.

Table 1 presents results of the Northern fish search. Approximately 75% of the citations have been evaluated so this represents that portion. Total hits were approximately 1300 of which 892 are represented here.

Northern databases are grouped together, as are subject databases to facilitate analysis. As you can see, the 10 databases searched were ASTIS, BNT, Boreal, COLD, Aquaref (a Canadian database), Aquatic Sciences & Fisheries Abstracts, BIOSIS, Elias (the union catalog of the Environment Canada Libraries network), Life Sciences Collection and Zoological Record. Choices were based on personal knowledge and Cuadra's Directory. It is our belief that, in most cases, searchers know only a few databases well and rely on directories or cross-file searching when that fails. They know little about the mandate of each database.

Relevant hits are those that the researchers returned to us with an \* (new and wonderful) or an R (relevant). No analysis has yet been done on the ? or non-relevant citations for duplication.

Percent Relevancy for each database is given. In most cases, relevancy was higher in the northern databases than in the subject databases. This is probably since these researchers were interested in geographically specific (i.e., Northern) application but may also argue in favour of geographic descriptors.

As a group the northern database results were 55% relevant while the subject databases were 41% relevant for a total relevancy of 44%. In a major study reported in the May '88 issue of JASIS<sup>1</sup> with 40 questions each searched 5 times with a result of almost 9000 records, 59% of the records were judged relevant. Thus our relevancy is within range. We need to examine the hits further in those databases with low relevancy.

<sup>1</sup>Saracevic, T., et al., "A Study of Information Seeking and Retrieving"  
JASIS 39(3): 161-216, May 1988.

TABLE 1: Retrieval

<u>FISH BIOLOGY</u>				
	<u>Total Hits</u>	<u>Relevant Hits</u>	<u>% Relevancy</u>	<u>Unique Hits</u>
Northern Databases				
ASTIS	73	44	60	15
BNT	143	68	48	30
BOREAL	91	56	62	29
COLD	<u>39</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
	346	168	55	74
Subject Databases				
AQUAREF	141	96	68	51
ASFA	86	41	48	7
BIOSIS	125	40	32	17
ELIAS	6	4	67	1
LSC	94	17	18	4
ZR	<u>94</u>	<u>25</u>	<u>27</u>	<u>12</u>
	546	223	41	92
Overall	892	391	44	166

The final column gives the number of unique relevant items retrieved in each database. Note that the total number of unique items is about half the total number of relevant items. Every database had at least one relevant record. There is an interesting reversal of the percent relevancy: now 45% of the unique records are from northern databases while 55% are from subject databases.

Figure 1 presents duplication results. Looking at the overlap, 107 or 27% of the records appeared in more than one database. On average, these appeared 2.5 times. Two records appeared in 5 of the 10 databases searched. However, this level of duplication suggests there is not a core covered by everyone. There seems to be no easy way to get 80% of the records. No two databases provide even 50% of the records available. Searching a minimum of four seems to be necessary. The northern databases and Aquaref would provide 60%.

### FISH BIOLOGY

27% (107) of the relevant records (391) appeared in more than 1 database.

Those that were duplicated appeared in an average of 2.5 databases.

51 appeared in	2 databases
19	3
8	4
2	5

All Northern Databases plus AQUAREF would provide 60% of the references.

No two databases provide even 50% of the total retrieval.

FIGURE 1: Duplication

Figure 2 illustrates that the specific overlaps are not particularly high with 23% being the highest and an overall overlap of 15% between northern databases and subject databases. However this is a significant overlap when costs of production and retrieval are considered.

### FISH BIOLOGY

	<u>% Overlap</u>
23 records were in both BNT and BOREAL	23%
20 records were in both AQUAREF and ASFA	18%
13 records were in both ASTIS and BOREAL	15%
13 records were in both ASTIS and BNT	13%
11 records were in both ASTIS and ASFA	15%
8 records were in both BIOSIS and ZR	22%

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50 records were in both a Northern database and a Subject database for an overall overlap of 15%.

FIGURE 2: Overlap

The overlap between AQUAREF and ASFA is interesting on two counts -- AQUAREF is a Canadian produced database so it is almost defacto a "Northern Database". Secondly, although the retrieval, relevancy and uniqueness were high our researcher consistently preferred the ASFA abstracts to the AQUAREF abstracts, volunteering this information to us.

On Table 2, we have the results from the forestry search. The question involved climate change so Meteorological & Geostrophysical Abstracts was included. This time 9 databases were searched.

Again you can see the total hits, the relevant hits with the percentage for each database (overall 39%) and finally the number of unique records. Once again the percent of unique records is the reverse of the percent of relevant records when northern databases are compared with subject databases. 58% of the records from the northern databases were relevant and 31% of these from the subject database were relevant. However of the unique records, 37% were from Northern Databases while 63% were from Subject Databases. Every database had at least one unique, relevant record.

TABLE 2: Retrieval

<u>FORESTRY</u>				
	<u>Total Hits</u>	<u>Relevant Hits</u>	<u>% Relevancy</u>	<u>Unique Hits</u>
Northern Databases				
ASTIS	44	36	82	23
BNT	16	4	25	1
BOREAL	48	35	73	20
COLD	<u>79</u>	<u>33</u>	<u>43</u>	<u>23</u>
	187	108	58	67
Subject Databases				
AGRICOLA	63	15	24	12
BIOSIS	81	41	51	30
CAB	146	47	32	37
MGA	7	4	57	3
NTIS	<u>152</u>	<u>34</u>	<u>57</u>	<u>30</u>
	449	141	31	112
Overall	636	249	39	179

Figure 3 illustrates that the duplication is lower in this search -- 14% (vs. 27%) or 31 out of 249 records.

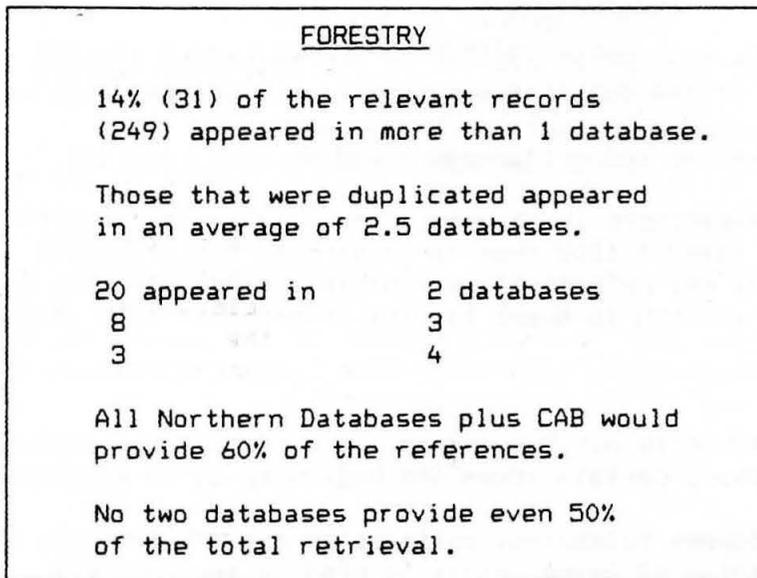


FIGURE 3: Duplication

The average times a duplicate appeared is similar--2.4.

Again there is no easy combination of a couple of databases for 50 or more percent retrieval. The northern databases and CAB would provide 60%.

Figure 4 illustrates the overlap between specific databases -- the highest overlap is 13%, occurring between both Boreal and ASTIS and Boreal and COLD.

Overlap between Northern and Subject databases was only 5%.

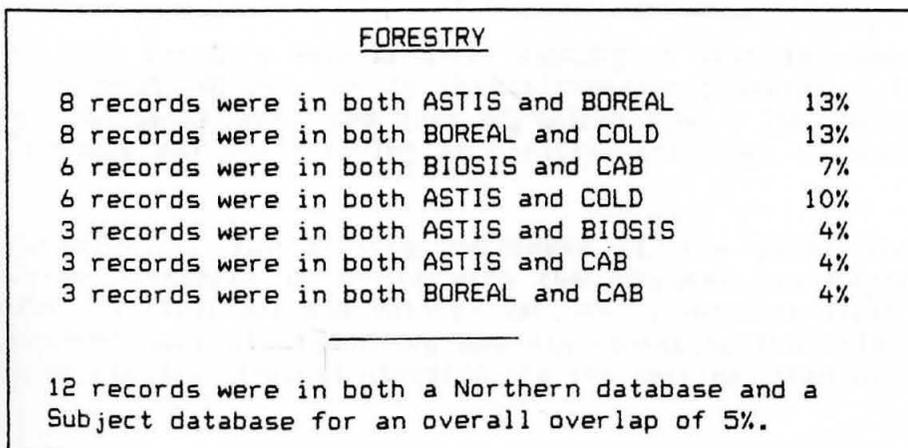


FIGURE 4: Overlap

It is still necessary to analyze the data further. Some things which still need to be done are:

1. Review the mandate of each database in order to confirm that questions posed did indeed fall within the mandate of the database.
2. Examine the sources of overlap in the duplicate citations to determine if the duplicates have a common source, e.g., Arctic.
3. Examine overlap and uniqueness based on date coverage.
4. Ask the researchers if they felt the information received was worth the time it took them to go through the printouts and whether any key references were missed. Also, how much would they have been willing to spend for the information they received?

### Conclusions

It is not possible to put forward any firm conclusions based on the work done so far. However, certain ideas are beginning to be suggested.

The overlap between databases, while it is not irritatingly high, is still significant in terms of being costly to produce and retrieve. The overlap is also still low enough between databases, including between northern databases, northern and subject databases, and subject databases, to be intriguing. It suggests that the problems of lack of comprehensiveness are not unique to northern databases. But why should northern databases compound the problem? This trend reinforces many of the discussions which have been occurring at this conference. Producers of northern databases should be working towards national northern databases and, indeed, towards an international polar database.

The overlap also suggests to the producers of multidisciplinary databases that they can no longer afford to be generalists. No one person or even a few people can be expected to know all the databases necessary in order to serve a multidisciplinary clientele well. It is not only time to cooperate, it is time to specialize.

\* \* \*

# **New Approaches to Information Delivery**

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## Abstract

The solution to a discrete community's information needs: is it a single database, a single vendor, a front-end package for his/her microcomputer, a gateway system, directories, a network of expertise, or a network combining all of the above?

The process of decision making is enriched by the knowledge of the trials and tribulations, successes and failures of others. The authors will provide case studies of various solutions proposed by professional groups, industries and the information community. Some have been implemented, others are in the planning stages; but, where applicable, they each will include: the makeup of the originating group, the rationale behind the product, the planning and implementation and the ultimate results.

## Introduction

The 70's and 80's have seen the dawning of what is commonly referred to as the Information Age. We in the information professions have always been aware of the importance, and cost of information. The users of information are now aware and are arriving at creative solutions to meet their distinct needs.

Historically, the growing awareness of the value and importance of information developed in tandem with the computer revolution. The learned societies, institutions and various national government departments undertook the responsibility of organizing and disseminating the information in their respective fields. Typical examples are the American Chemical Society and the

U. S. National Library of Medicine. These same societies and institutions were the first to explore the use of the computer in accomplishing this task.

Initially computers were employed 1) to cope with the rapid expansion of scientific information and 2) to improve the cost effectiveness of providing printed abstracting and indexing services. The use of computers to prepare these resulted in indexes that were more up to date, more comprehensive in coverage and allowed for more frequent and better cumulation of indexes. The use of computers eventually allowed the repackaging of the machine-readable files. Access to this retrospective information occurred in 'batch mode', but this mode of access was soon replaced by the on-line retrieval systems so common today.

As the value of information continued to increase, other players entered the field with a variety of solutions. Information producers attempted to identify the needs of specific groups and create products for them. The discrete communities themselves initiated information packages, at times acting through third party specialists. Vendors attempted to corner the market in certain disciplinary areas. There have been numerous initiatives in developing gateways or front-end interfaces for the information consumer. New opportunities are arising as CD-ROM's and laserdiscs enter the scene.

In this paper, the authors have attempted to categorize, review and analyze the various information solutions which have merged to meet the needs of specialized user groups. The authors have purposely omitted examples developed for the polar or northern user groups since these are well known to us. There may be lessons to be learned from the trials and tribulations, successes and failures of others.

### Information Producers

Information producers can be defined as for-profit companies (Institute for Scientific Information) or not-for-profit companies (Biosciences Information Service or Tulsa/Petroleum Abstracts) who create information packages for an identifiable market.

Biosciences Information Service (BIOSIS) is a typical example of an information producer which has traditionally relied on print products and online vendors to transmit its information package. With personal computers becoming so commonplace, there has been a concerted effort on its part recently to become actively involved in the online distribution business. BIOSIS has embarked on a new online service called BIOSIS Connection whose goal is to "support the research and communication needs of the international life science community." It plans to do this by offering a number of small, specific databases of interest to the life scientist which can be accessed via personal computer either in menu mode or expert mode. The databases announced so far emphasize current awareness and consist of the following:

- BioMeetings: 12 month file of hard-to-find references to life science research from meetings and symposia, updated monthly
- BioBooks: synopses, publication information, chapter references to recently published books, updated monthly

- BioExpress: 12 weeks of reference citations, updated weekly
- BioPatents: 18 month file to recent U. S. Patents in biotechnology  
biomedicine, agriculture & food technology, updated  
semi-monthly
- Forthcoming Events:  
future meetings, seminars, symposia, special events
- Serial Sources:  
information on 16,000 life science journals

Other databases such as Jobline, BioTheses, Forthcoming Publications, and an AIDS file are in preparation. Under investigation are such services as document delivery and online registration for meetings.

It is still too early to tell if this new service will be successful. Current awareness seems to be its main thrust, but end-user access to the full database may follow at a later phase.

Another information producer that has become directly involved in online distribution is Chemical Abstracts Service. Though associated with the American Chemical Society, Chemical Abstracts Service operates as a financially self-supporting unit within the Society. Its databases are available through several vendors, however, this producer was dissatisfied with the level of access possible on these vendor systems. Through STN International, a conglomerate formed jointly with Fiz Karlsruhe-ute Manning-Lehr, specialist access is provided through CAS Online which is geared to the needs of the chemistry community. CAS Online allows access to substance information by structure, name or formula. Ring structures can be created on a graphics terminal to be searched in the database and can be displayed on the screen or on a dot matrix printer. Abstracts that are searchable and displayable have been added. Unlimited downloading for personal use is allowed. In addition, Chemical Abstracts Service offers the full text of its journals for electronic retrieval and has recently added CA Previews, a current awareness file.

This information producer has created files which only a chemist can use effectively and it is offering major discounts to academic users to increase its market base.

Other examples of specialized services offered by information producers are the statistical databases created by Oil and Gas Journal and the Canadian Petroleum Association where numerical data can be manipulated by experts in the field.

The Institute for Scientific Information (ISI) has taken a different approach to packaging information. It offers three software programs known as SCIMATE which allow a user to search a database through a vendor, download and reformat the information to create one's own database. The third software program features online report creation. So far, ISI has not offered special access to its own databases, nor has it created specialist databases. It has begun to expand its delivery mechanisms by marketing databases on CD-ROM.

In summary, successful information producers today are recognizing the need for greater awareness of their market's distinct needs and are delivering their products in new and varied ways, especially geared to the end-user base.

### Information User Groups

Information user groups can be defined as a community of people who share common discipline/industry related interests and information needs. Some Canadian examples of information user groups who are struggling with solutions to their perceived information needs are the manufacturing industry, the construction industry and chartered accountants. One of these groups is developing its own product, while the other two have sought third party help.

Canadian Manufacturing Advance Technology Exchange (CAN-MATE), funded by National Research Council Canada is designed to provide a centralized source of information and advice for manufacturers in an effort to increase their competitiveness in world markets. Its goals are to foster cooperation and information expertise exchange between the private sector, CAD/CAM centres and government facilities.

CAN-MATE envisaged "an enquiry system for manufacturers, linked electronically to foreign and domestic technology bases, the preparation and distribution of bulletins on up-to-date developments in advanced manufacturing technology and the arrangement of seminars, workshops and training programs with other organizations and groups." In the two years since its establishment, CAN-MATE seems to have made limited progress both in technology use and scope.

In March, 1988, it sponsored its first annual coordinating conference linking universities and governments in an effort to promote communication with the manufacturing community. It has begun publishing a monthly newsletter "Technology Source" designed to provide manufacturers with fast access to information on applications of new technologies. Each issue highlights abstracts of articles on file in the CAN-MATE office and announces publications and events. Photocopies are available via a toll free number. Electronic copies are available via electronic mail.

CAN-MATE solicits case studies from manufacturers describing their achievements in operational efficiency as well as descriptions of technological breakthroughs and successful installations from technology centers. This is their solution to bridging the gap between research and application.

While CAN-MATE is developing its information packages in-house, the Canadian Institute of Chartered Accountants (CICA) has created an access package which contains: 1) PC-based menu driven software which allows one to prepare search commands or messages offline and which automatically logs on to any desired service, carries out the search requested, then automatically downloads the results in one's computer, 2) information access to available financial, taxation, business and economic information through such Canadian information producers as I.P. Sharp, Infomart, Insight, Fiscal Agents Ltd. and Statistics

Canada, 3) access to two new databases created by CICA with third party help- Canadian Financial Database and Canadian Tax Online, and 4) access to the CNCP Dialcom Electronic Mail Service. Bulletin boards on E-mail contain a listing of coming events and a catalogue of available publications. Ordering of publications and registration to seminars are possible online.

A survey of the Canadian construction industry conducted in 1985 by the Canadian Construction Research Board identified the transfer of information and technology as a high priority to increase the industry's competitive edge. Three federal government agencies together with the industry began laying the groundwork for a Canadian Construction Information System (CCIS). A private sector consortium consisting of DESCON International and Southam Communications Ltd. was awarded the contract to design and market this system.

Incorporated in August 1986, CCIS is planning to offer three services: 1) an electronic gateway to industry specific databases in all data formats including messaging and transmission of architectural drawings 2) a directory, in electronic and printed form, of construction information sources and services and 3) an expertise network.

The system will endeavor to meet both the specific and general needs of its clients, e.g. the need for information on locally manufactured and distributed building products, as well as the need for information on codes, standards and nationally distributed products. A project officer, from the Canada Institute for Scientific and Technical Information has been assigned to ensure that it meets those goals.

To date, an official newsletter, "Connection" has begun. A database of 2000 records called Publications of the Institute for Research in Construction has been made available on CAN/OLE. Several market surveys to assess the industry's information needs have been completed. A prototype system has been developed and is available in a number of test centers across Canada. It currently includes a directory of federal government databases and information sources. Similar directories of information sources in the private sector and in provincial and municipal governments will follow. A list of experts is being established.

The American College of Obstetricians and Gynecologists (ACOG), the national professional society for more than 26,000 medical professionals, offers an example of an integrated approach to information management. Spurred on by the recommendations of a report commissioned by the Association of American Medical Colleges which urged health organizations to adopt and utilize appropriate information technologies, ACOG obtained a grant from the National Library of Medicine for a project which would identify the core knowledge necessary to practice obstetrics and gynecology, put this information in electronic format, integrate it via a national network, and teach members to use the information. The knowledge base will consist of library holdings, full text ACOG publications, computer software for patient logs, bulletin boards and access to suitable existing bibliographic and full text databases.

A British example of an information package generated by a user group is British Expertise in Science and Technology (B.E.S.T.). A government

sponsored report entitled "Improving Research Links Between Higher Education and Industry" provided the impetus for its creation. In 1984, the universities took the first step by setting up a national steering committee composed of government, industry and university representatives. This steering committee outlined its needs and invited proposals from the private sector. Longmann Cartermill, a publishing company, was selected.

The B.E.S.T. database contains two types of information: 1) information on researchers and their expertise and 2) information on services and facilities available in UK Universities, polytechnics and government research establishments. B.E.S.T. is offered in offline or online mode with confidentiality of searches assured.

The majority of these projects have a solid grasp of their market needs through preliminary analysis. This is especially true of CICA, CCIS, and ACOG. Continual monitoring of these needs is essential for success to be assured. CAN-MATE appears to have been funded prior to the analysis stage and has yet to clearly identify the market it is trying to serve. To date, B.E.S.T. has become a success due to the persistence of the producer and a commitment on the part of the universities to ensure its currency and accuracy. Marketing and customer support play a crucial role in the success of any user generated information package. Although the CICA product is well designed, the Institute has not marketed professionally, and they have failed to provide the type of ongoing support required by an online service such as training and a help desk.

### Vendors

Another solution to a discrete community's needs can be offered by vendors who specialize in certain types of databases. Some examples are Lexis/Nexis or QL Systems which specialize in legal databases; Pergamon/Orbit which specializes in patents; Infoglobe and Infomart which specialize in Canadian newspaper databases.

Problems of access are simplified for users since only one set of system commands needs to be learned in order to obtain comprehensive information. DIALOG is experimenting with grouping subject databases in one convenient package with menu driven software as an added bonus. Business Connection and Medical Connection are examples of these. Many database vendors are now adding the menu-driven component to the front-end of their software. Most provide it as an option; Infoglobe forces all users through the menus.

Regrettably, vendor specialization has not been upheld. Most vendors who began with the intention of specializing have been forced to become broader based (although not all have succumbed to the "database supermarket" approach of DIALOG). The DIALOG connection packages do not appear to have reached a large market to date, perhaps because their cost is prohibitive in relation to other products now available to end-users. Infoglobe, on the other hand, does seem to be capturing a much broader market through its menu-driven interface.

Some vendors have become noted for different specializations in different geographic markets. For example; the North American office of Data-Star, a Swiss-owned vendor, serves a completely different market need in North America than it does in Europe. European customers look to it for its suite of medical/pharmaceutical databases or its strong group of business sources. In the U.S. and Canada, its specialities become the European databases that are not available elsewhere.

## Networks

Developments in the area of networks provide another kind of solution to a discrete community's needs.

Powerful online systems in the 70's fostered the development of large cooperative bibliographic utilities such as OCLC and Utlas. Librarians began to dream of the possibility of creating a "total library system" at the national level which could be operated by one of these systems. This idea was abandoned as being too costly and impractical and cooperative projects and linkages are rising to take its place.

One example of a cooperative project is the Colorado Alliance of Research Libraries (CARL) in which 6 libraries formed a consortium to develop a joint online catalog and circulation system. CARL supports over 400 terminals, has dial-in ports, is linked with the campus computer network at the University of Colorado at Boulder, and has several additional databases which it has loaded for the benefit of all the member libraries. This type of cooperative project which allows access to an individual has potential benefits for user communities.

There is the ability to link dissimilar integrated systems via an intermediate system containing a protocol convertor which translates commands to a common search language. This type of networking has been done in Colorado via the Irving Project. Again, this can be of direct benefit in packaging similar databases for user groups.

A low-tech solution to networking in a particular subject area has been attempted by the European Biotechnology Information Project. Housed at the British library, the Ebip project began with funding from the European Commission in 1984 and circulates information to 2000 people in biotechnology business and research. Through the collaboration of European information centres, Ebip provides an enquiry service, publications (information guides to key sources of information, market research reports) and offers seminars and conferences to business users and researchers. Plans progress for a fully electronic network under the European Biotechnology Information Project. While awaiting this vital link throughout Europe, the Ebip appears to have successfully tapped the needs of the end-user market, they have improved access to sources of information and they arrange education and training programs.

## Gateways

Gateways ideally provide the user with simplified front-end access to the maze of search systems and services. A gateway can reside on a main frame in

between the user and the ultimate database or it can be a disc which the user inserts into his own computer.

Easynet is perhaps the best known gateway. Begun in 1984, it has taken on many forms and is marketed under many names (depending upon the target market). It links untrained users to over 800 databases with a menu-driven common search language.

Studies have been done which point out the drawbacks in oversimplifying search choices and strategies but they also clearly indicate the validity of offering universal access to search services.

To investigate the potential for a flat rate fee structure based upon monthly usage, Easynet tested the impact that universal access would have in two library environments. They placed "The Answer Machine" in the reference areas of a public library and an academic library and offered unlimited free access to Easynet for a trial period. The computer in the academic library was lined up from opening until closing every day (thereby ruling out the possibility of a flat rate charge that the library could afford) but the number of users in the public library setting was manageable and, therefore, the flat rate could be affordable (at least at the outset).

This innovative approach to information delivery by a third party gateway "keeper" offers much broader access to a wide range of information users who would otherwise not have discovered databases. At the same time it opens up the market for information providers and offers them more challenges in meeting their markets' varied and changing needs.

The Electronic Industry Information Centre is an Alberta Government gateway type project based on i-Net 2000 which has just passed its first year trial. Basically an electronic messaging system, it has created some of its own databases (such as a calendar of events, directories and tenders) and provides third party access to external databases. EIIC has not maintained a high level of usage over the past year and the possible reasons include: a low profile within the potential market groups, no needs assessment follow-up and infrequent or inconsistent updating of the files.

### Other Media

CD-ROM has provided information producers with a delivery method which lends itself well to "bundled products". Products of a similar area of research, produced by competitors, are combined by a third party to form a comprehensive information package.

Laser disc technology offers other exciting developments. In the BBC and BBCIV Domsday Project, information is tied to geographic coordinates. One can zoom in on a geographic area and obtain any information on the disc referring to that area. So far, this project has cost in excess of \$6 million

to develop, but as technology and experience in the area develops, similar projects may become affordable.

A good example of a third party producer is DATEXT. They combine corporate and financial records from various databases, standardize them and put them on a number of discs, aimed at the business market. CD/CORPORATE, CD/PRIVATE and CD/INTERNATIONAL hold general corporate information; but CD/CORPTECH (Technologies) and CD/BANKING are more specific. Their clients are large corporations who have an ongoing need for such information and the CD player does not necessarily reside in the corporate library.

### Conclusion

We have demonstrated that there are various models that discrete communities can use to satisfy their information needs.

The above examples demonstrate apparent successes and possible failures and all underline the critical issues that must be addressed in the development of any form of information delivery mechanism:

- market needs analysis
- ongoing monitoring of market
- market awareness
- accessibility and ease of use
- customer support and training

As emerging technologies provide us with an increasing number of options and numerous groups pave the way and provide valuable lessons, the potential is high for development of a model perfectly suited to any type of user group.

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# Myths or Truths of Northern Information Provision: Some Points for Discussion

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## Is Understanding of the North Inherently Romantic?

How did you first learn of the north? What shaped the public's perceptions of the north? Are those perceptions historically based? Are those perceptions based upon scientific investigation? Have those perceptions changed within the past 10 years?

I well remember my first contact with northern stories, and I will share a bit with you, a bit that was rekindled weekly on the family radio:

(audio clip from "Sergeant Preston of the Yukon and his wonder dog King").

As a child I remember waiting for the next episode of the radio series when Sergeant Preston and King maintained law and order in Whitehorse and Dawson. Goose bumps of excitement alternately froze then melted as the winds whipped down the White Pass, then beating unmercifully on the Mountie and his faithful companion. Those primitive radio sound machines evoked chills sufficient to bring a cup of hot chocolate to my quaking lips as Sergeant Preston and King's teeth chattered in the cold.

After the passage of 30 years and 10 generations of technological and media sophistication, I still arrange my Saturday morning schedule around the 10 a.m. program slot of "Sergeant Preston of the Yukon" on local Fairbanks radio.

In this contemporary setting I'm certain most of us have personal stories to tell about what attracted us northward in person or professionally to deal with the northern information. Among us, I suspect few were born and reared in northern environments, but we do now have this common interest in northern information.

Has the basis for the public's knowledge and curiosity about the north changed significantly in the past decade? Have the quality and types of information changed? Are kids growing up now still developing the romantic "Sergeant Preston" views of life in the north?

## Media and Science

Science and media appear to be the sources from which most people learn about the contemporary polar regions—north and south. Whose home and classroom has not been touched by the photostories of northern people and wildlife through "National Geographic" and similar magazines. Significant amounts of television programming on Public Television, the Canadian Broadcasting System, and the British Broadcasting System tell of the people, fauna, and flora of the northern and polar regions. And most recently, significant science stories tell of the north's pivotal role in the global systems of weather and the oceans. The nuclear disaster of Chernobyl and the increasing research on ozone depletion reveal how a localized phenomenon becomes a regional and international one, and how physical phenomena occurring in a little known part of the world become the focus of international attention for people of all nationalities and political philosophies.

Many northerners value the north's physical and social isolation, a place of solitude. However, the scientific realities of Arctic haze, acid rain, air-borne pollution from non-polar regions intrude upon the north, provoking northerners to break their isolation and communicate to those in southern climes.

Southerners too now see how the seemingly isolated Arctic and Antarctic influence weather systems and dynamic atmospheric processes affecting all portions of the earth. These processes illustrate the physical interrelationships and scientific global connections linking northerner with non-northerner.

Does the current attention to scientific information signal a greater public interest in the polar regions? Has scientific information reached the hands of writers who can better communicate research issues and results to the public? Has science become inclusive and comprehensive rather than isolated and narrowly focused? What are the resultant information trends, and what do they signify for northern libraries?

### Can Russian-America Become an International, Informational Bridge during Perestroika?

The recent Moscow summit between General Secretary Mikhail Gorbachev and President Ronald Reagan was significant for improving relations between the Soviet Union and the United States. The resulting improved relations particularly in academic and cultural exchanges, and research can also benefit those of us with polar interests because information exchange is our business.

It is symbolic that the General Secretary used the Arctic Ocean port of Murmansk as the site of a major speech on October 1, 1987. Although located about as far north as Barrow, Murmansk is the Soviet Union's only major port with wartime access to the world's oceans. With a population of approximately 310,000, Murmansk is an industrial-military-maritime complex strategic to the protection of the Soviet Kola Peninsula (DuBay, p. 196). Murmansk, the world's largest naval base, was symbolically the location where Gorbachev urged "a radical lowering of the level of military confrontation in the region" and peaceful cooperation in developing the resources of the Arctic. He added, the Soviet Union "attaches special importance to the cooperation of

the northern countries in environmental protection" (Conservation Foundation, p.5).

Alaska and Siberia are joined by a scientific-medical program through the Siberian Branch of the Academy of Medical Sciences and the University of Alaska Anchorage. Dr. Ted Mala of the University of Alaska Anchorage was instrumental in establishing the exchange to research common health problems. His Eskimo father Ray Mala was an early Hollywood Eskimo movie star, and his Russian mother Galina Liss was born in Kazan (Tundra Times). This "Alaska-Siberia Medical Research Program" is already functioning and may be a precursor for subsequent exchanges. Fortunately for those of us concerned with northern information, and as we heard in a previous paper, Barbara Sokolov and Cathy Innes-Taylor are contemplating the data and information components of this medical exchange.

Prior to the current thaw in the "ice" curtain across the Bering Strait, the Smithsonian Institution, in collaboration with the U.S.S.R. Academy of Sciences, initiated plans for a major international exhibition on the traditional cultures and art of Siberia, the Aleutians, Alaska, and the Pacific Northwest. Anthropologists from the Smithsonian, the American Museum of Natural History, and the Soviet Institute of Ethnology were interested in joining together scholars of these north Pacific cultures with their alienated collections, that is material collections previously unavailable for study because of the formidable barriers of politics, language, and publication availability.

Historically, the 18th and 19th century Aleut, Eskimo, and Northwest Coast artifacts were obtained by Russian explorers and scientists during the Russian-America period, and these materials, largely unstudied by non-Soviet scholars and researchers, reside in Leningrad. Ironically the early Siberian cultural history materials of the Siberian Eskimo, Chukchi, Koryak, Kamchadal, Yakut, Tungus, etc., collected by Kennicot, Dahl, Nelson, Bogoras, Jochelson, and Lauffer of the Jesup North Pacific Expeditions are in the Smithsonian in Washington, D.C., or the American Museum of Natural History in New York City.

Appropriately titled "Crossroads of Continents", this exhibition will open this September in Washington, D.C., and later be displayed in New York City, Seattle, Indianapolis, Anchorage, Ottawa, Moscow, Leningrad, and other sites in the USSR (Smithsonian Institution).

While the world is waiting for peeks through the General Secretary's "iron curtain", we Alaskans are experiencing the thaw in the "ice" curtain across the Bering Strait. As the curtain melts we have the exciting challenge of preparing for these information exchanges in varied forms.

#### Are We Dynamic Participants in the Information Revolution?

Is the north merely a focal point from which information and data are extracted for processing and use in more southern locations? What desires, capabilities, and needs exist in the north for the increasing amount of northern information and data? As the information professionals most directly involved, do we have mutual goals and the unified will to actively lead in this northern information business?

The north is experiencing the information explosion. Added to the information increase are political, economic, national security, and scientific influences significantly focusing upon the Arctic and Antarctic regions. This is exemplified in the United States by the "Arctic Research and Policy Act"-mandated comprehensive Arctic Research plan, and in the Soviet Union by General Secretary Mikhail Gorbachev's call for a conference of sub-Arctic states to discuss the coordination of scientific research in the Arctic (Molnia, p.53).

Dr. Juan Roederer, chairman of the Arctic Research Commission, who earlier addressed this Colloquy, presented his thoughts about northern information and data during a Fairbanks' reception of the "Rasmuson Library Associates", friends of the University Library. His comments were provocative, and he referred to the now decade-old Arthur D. Little, Inc. study entitled "Into the Information Age: A Perspective for Federal Action on Information". A subsequent review of that report reveals a comprehensive articulation of many of the continuing concerns for northern information specialists.

The Little study well chronicled the problems facing those dealing with scientific and technical information through public, special, and academic libraries; the double economic squeeze of decreasing budgets and increasing costs for materials thereby possibly cutting significant publics out of the information flow. Learned and professional societies which traditionally influenced the quality of research and information are suffering as libraries have less funding for those specialized journals (Arthur D. Little, Inc., p.49). And particularly significant is the broadening of research to be multi-disciplinary and more complex, contrasted to the narrow and single disciple approaches of earlier times (Ibid., p.24).

Emerging from the Little analysis was the recognition of a "second tier" of services for a fee beyond those currently available at no cost. Challenging the tradition of "free" libraries, the changes in economics and information technology have necessitated this "second tier" of "for fee" services using market mechanisms on a partially subsidized not-for-profit basis (Ibid., p.117). And during the past decade that "second tier" has materialized.

The Little study similarly acknowledged the need and subsequent emergence of "information intermediaries" to assist users with information in its increasingly varied forms, intermediaries who "package" information appropriately for users. Layers of intermediaries increase the distance between the users and source information; however, technological changes in information production, storage, and access necessitating the intermediaries have dramatically increased the depth, diversity, and quantity of information. And, only through the use of such intermediaries (increasingly fee-based) can access be gained.

This growing significance of the Arctic, and northern information and data is further evident by the presence of policy- and decision-makers in our midst. While they are with us we must effectively take the initiative and become a part of that policy development process to ensure our information and data concerns are equitably represented.

What, if any, are the common issues transcending national boundaries which would be significant to our long-term mutual well-being? What standards should be encouraged for new data and information to ensure use by our patrons? Could collection development guidelines and materials sharing be seen as ways to stretch fiscal resources rather than asserting rights to "turf"?

In conclusion, I wonder what our roles should be as Northern library professionals? Should we passively be overwhelmed by the thaws and deluges of the "information revolution" and romantically await a rescue by Sergeant Preston and King? Or perhaps like polar scientists—through mutual aid, interest, planning and a mutual "will"—can we truly reflect the theme of this colloquy, "Northern Information—the Global Connection".

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# **NWT Public Library Services: The Giant Leap to Resource Sharing**

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## **Abstract**

NWT Library Services has recently been funded to develop an automated union catalog consisting of records from NWT Public Library Services and the Government Library. To facilitate this development, communications networks for Phase 1 are being planned that will link via dedicated circuit, the Yellowknife Public Library and the Government Library with Public Library Services in Hay River. Following the RECON project of these bibliographic records estimated for completion in April, 1989, the decentralized network will be extended to the Baffin and Keewatin Regional Libraries, Inuvik, Fort Smith, and finally the Kitikmeot Region of the NWT. Other libraries in the NWT are also considering adding their records to this data base.

This constitutes a giant leap for all residents throughout the NWT who will then have access to the data base on either COM or CD ROM catalogues in any one of 23 community libraries or on-line in the Regional Centres. Currently, the only union catalog is located in Hay River at the NWT Centennial Library.

In 1988, NWT Public Library Services is celebrating its 20th anniversary of providing a formal library service in the territory. It is fitting that we take a look at where we have come from and where we are going in providing an information service to NWT residents in particular, and visitors and out of Territory users more generally.

There are a great many complexities in offering a library service in an environment such as the NWT. The NWT physical environment represents 1,252,743 square miles and a population of 52,230 persons (1986 Census figures), 11,753 of whom reside in the capital city of Yellowknife. The majority of our residents could be classified as remote users. There are seven aboriginal languages in the NWT and in 1990, French will become an official language.



Transportation routes in the NWT still tend to be on the north-south axis with the Western Arctic relating more closely to the Province of Alberta, and the Eastern Arctic to Manitoba and Quebec. Two nationwide but non-interconnected telecommunications networks operate in the NWT (those of Telecom Canada and of CNCP).

A recent move in 1986 to bring Library Services, Museums and Archives into the Department of Culture and Communications has made a positive contribution towards the development of libraries in the NWT. A more focused support to develop cultural and information services has been translated into providing necessary resources for library development. To fulfill its mandate of providing library service to communities, NWTPLS now has twenty-three member libraries located within six regions. Eight of these libraries are either community school services, adjacent to adult education centres, or in school facilities. All community library staff other than in Inuvik and Yellowknife are part-time. There are four full-time professional librarians at Headquarters in Hay River, a professional librarian for the City of Yellowknife, and a professional Regional Librarian position in the Baffin operating out of Iqaluit. A part-time regional librarian for the Keewatin is located in Rankin Inlet.

Public Library Services has served as the central purchasing, cataloging and distribution agency for the public libraries in the NWT. Libraries such as Yellowknife, Rankin Inlet, Fort Smith, and Inuvik who purchase materials using community generated funds, contribute to the Headquarter's catalog. However, union catalog of holdings is available only to residents of Hay River although cards are made available of each libraries own collection. Public Library Services offers a request and interlibrary loan service for all the member libraries in the system. A study is currently being conducted on the feasibility of providing a toll free reference and information service out of a joint facility in Yellowknife. Through a special agreement with Alberta Culture, Library Services has strong backup in a resource sharing agreement allowing access to the total collections of the Province of Alberta and a reference support service via a toll-free line.

An environment such as the NWT with a small population spread over a large area creates exceptionally high costs for service. It is obviously necessary in a time of shrinking resources to explore alternatives in library service. Libraries in the NWT are proactively taking the initiative in a number of ways to network and share resources. The first step for Public Library Services is to develop an NWT data base of bibliographic information and to facilitate resource sharing. The following basic principles form the framework for our decision making as the process of development continues:

1. All residents of the NWT should have reasonable access to the wealth of published material available in the data base.
2. All participation in the data base and consequently networking is voluntary. Collections contributed to the data base are subject to local policies and regulations with the exception of bibliographic standards which are universally applied.
3. The bibliographic unit will be in the MARC format utilizing LC subject headings. A subject authority file for northern and native titles will be developed by a working committee of data base users.

4. The network is not intended to replace current services or facilities but rather to facilitate better service through sharing of resources.
5. Management of resource sharing requires the following:
  - a decision-making process that allows equal participation among all users
  - well developed communication processes and technology
  - a method to oversee activities, and to allow for flexibility in responding to changes when required.

In November, 1987, following two years of planning, Library Services entered into an agreement with Sobeco Group Ltd. of Montreal to purchase an integrated library software product called Multilis as a turnkey system with an NCR Tower 600 minicomputer. Thus we began the long and arduous task of developing an automated union catalog of holdings of the Government Library and NWT Public Library Services to be made available on-line to libraries as communications allowed, and on CD Rom where communication links were available. (See implementation Appendix I.) This is to be the first phase of the development of an NWT network and a giant leap for us in the NWT from a completely manual system consisting of 6 different files and no catalog in the majority of community libraries.

Multilis was chosen for two reasons, the first one being its strong network options allowing each contributing library to have its own separate data base. These data bases can be kept separate and autonomous as a function of the software and are not dependent on the hardware used. The Unix operating system of Multilis provides multi-user capabilities on a single system sharing a single processor, files and data without having to get involved in a local area network. The software was originally developed for the University of Quebec multi-campus library system. It has since been adopted by Quebec Regional Libraries and many other public, special, and academic libraries in Canada and the United States.

Gene Kelly, Automation project co-ordinator of Laurentian University describes the networking strength of Multilis:

"The modules are designed to provide network libraries complete autonomy over local functions. A library having a separate data base can select its own loan, fine policies, and opening hours; it can specify who is given borrowing privileges, and it has complete control over local cataloging and authority record formats. Local control is also available for supplier and budget information files in the acquisition module.

The only common thread linking network libraries is the bibliographic. Everyone using the system can choose to search the entire network of bibliographic records in the on-line public catalog. Users are able to identify if the items they want are in the network library, however, they may not necessarily have borrowing privileges in the library in question and may be obliged to request the item through interlibrary loan. Bibliographic data is easily transferred

among the various network data bases, which are maintained as separate files linked to a single bibliographic record file. A network authority file allows the various libraries in a network to either subscribe to the network dictionary form of an authority record, or to choose their own local form of authority heading."

The second reason for choosing Multilis was its remarkable book exchange process which would allow for the automated inventory management of rotating collections from regional or Headquarters central depots. This software has been implemented in all regional libraries in the Province of Quebec. It entirely integrates to the exchange module the rest of the software modules available from Multilis. Because of its highly efficient management system based on mathematical models, a regional library collection can be exchanged far more economically and the use of the collection is maximized. Since the majority of our community library collections consist of materials obtained in rotating blocks, this new software saves considerable staff time and allows us to have up to date information about rotating materials.

Within Phase one of the NWT libraries implementation plan, the collection in the data base of approximately 100,000 titles will include material from the NWT Public Library Services Headquarters, regional, and community libraries. This will also include the northern collection of materials housed at the Yellowknife Public Library, a talking book collection of all titles in the system, and a developing videocassette collection which also contains materials in the area of northern/native/aboriginal languages.

The second part of the phase one collection will be inputting material from the Government Library consisting of approximately 20,000 titles. The Government Library emphasizes public policy, public administration, political science and management, particularly as they relate to northern issues. Added concentration is being placed on aboriginal rights and languages, and northern political development.

In order to make phase one of the data base development work, it was first necessary to overcome the communications barrier of having the host computer in a completely separate location from the majority of users requiring long distance telecommunications costs and two major non-connecting telecommunications companies. We received many proposals from software vendors, some of which included communications options for a turnkey system.

The variety of innovations and suggestions included such traditional methods for data communications as radio and satellite transmission to a more intriguing, almost science fiction scenario involving meteor bursts.

We were prepared to consider installing supermicros in each of the regional centres and periodically sending a disk for downloading the data base of that particular region's collection. This was because we were initially unable to find a reasonable, cost effective data transmission system for on-line access to our central data base in Hay River. Data transmission costs become even more relevant when one realizes that Library

1. Glen J. Kelly, Multilis: a description of the system design and operational features. DRAFT, pp. 3-4.

Services is considering making all its modules available to network users, including on-line public access catalog, circulation, cataloging, acquisitions, and the block exchange module. With the notorious track record of telecommunications down time in the NWT, or with the problems associated with satellite communication in the Fort Smith region because of whooping crane nesting sites being endangered by microwave transmission, it was more than just your normal challenge to devise a viable communications system.

Recently, a solution became available in a 9600 Baud dedicated circuit that would interconnect the Hay River host Tower 600 computer system to users in Yellowknife by means of a PACX (Private Automated Computer Exchange) operated by Systems and Computer Services Division of the Government of the NWT. This private network would allow other libraries to connect to the Library Services link in a private network and facilitate access to all regional centres as well as other communities which are linked to the GNWT mainframe communications system (see Appendix II). Technical expertise, installation and ongoing maintenance will be provided by Systems and Computer Services in Yellowknife. Because it is switched through the central computer installation in Yellowknife, this PACX will allow much easier access to the Library Services Tower 600 computer in Hay River for a number of potential data base contributors both within and outside of government. Library Services will add additional ports to its NCR Tower 600 and make available additional disk storage as the data base expands. Other benefits of this design would be DATAPAC access for Library Services to facilitate data base searching for reference requests.

At the present time other NWT libraries considering contributing to our data base by utilizing Multilis are Dene Nation Library and Archives, school librarians in Yellowknife, Department of Education professional collection in Yellowknife, Department of Public Works library, and NWT Science Institute. These initiatives could be implemented in Phase two of the development following the completion of the Library Services RECON project in April 1989.

Another initiative in support of resource sharing in the NWT was taken by the Northwest Territorial Library Association at a workshop on March 12, 1988 in Yellowknife when the following resolution was passed:

"The NWTLA has recognized the need to formalize in certain areas an existing informal network of co-operation which would use resources more efficiently and effectively, especially in times of financial restraint."

The NWTLA intends to prepare a brief for presentation to the Government House Leader of the NWT Legislative Assembly incorporating a description of the state of the art with libraries in the NWT, an identification of the advantages of resource sharing while protecting special collections, and improving service to remote areas of the NWT. This strong lobby force will certainly raise the profile of libraries in the NWT and hopefully effect a stronger co-ordination of Library Services between various libraries. Since library automation is very much in its infancy in the NWT, this will also serve as an educational tool. Finally, this is the first time that library practitioners have met as a whole to discuss formal and informal networking and resource sharing within a consensus decision-making environment.

The NWT Library Association is also actively involved in producing a comprehensive directory of libraries in the NWT available in all the NWT official languages. Another project under development is a union list of serials contributed to by all libraries in the NWT. Hopefully, this union list can also be made accessible on-line as a part of the NWT data base being developed in Hay River.

The introduction of the concept of an NWT data base of information is an exciting idea to those involved. For the first time, NWT residents will have access to information about collections available in the NWT. This new technology will have a major impetus on the development of regional and community library development. It will also change existing patterns and policies. Isolation because of distance will no longer dominate the lives of information seekers. The communications system linking libraries with Hay River will be useful for other tasks in addition to accessing the On-Line Public Access catalog such as electronic mail for requests and interlibrary loan.

There is an openness and inquisitiveness already apparent in discussions with potential NWT data base users and contributors. Although much education is still required, there is a clear motivation to make this technology work for people in the communities. Libraries and technology are very novel to the consciousness of northerners. However, we seem to be able to leap over generations of tradition more easily than southern institutions. We have started completely from scratch and can plan networks from the ground up. The challenge of resource sharing in the NWT is great but so are the potential rewards.

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H A R D W A R E

	Year 1 87-88	Year 2 88-89	Year 3 89-90	Year 4 90-91	Year 5 91-92
Headquarters Hay River	Tower 600 & disc stge 3 micros-HQ (640K-HD) 1 Dot Matrix Printer 1 Barcode Reader HQ 4 Laser Disk Readers	2 terminals 1 modem short haul 1 laser printer 1 Mux modem	NCR ports 1 modem Expansion Disk		
NWT Centennial Library Hay River		1 modem (short haul) 1 terminal			
Government Library Yellowknife	1 micro 1 modem(2400 baud) 1 printer	1 terminal 1 barcode reader 1 short haul modem 1 Mux modem			
Yellowknife Public Library		2 terminals 1 dot matrix printer 1 short haul modem 1 barcode reader	1 terminal		
Baffin Regional Library Iqaluit	1 micro 1 printer 1 modem(2400 baud)		1 terminal 2 modems 1 shorthaul modem 1 barcode reader		
Keewatin Regional Library Rankin Inlet			1 barcode reader 1 printer 2 modems(2400 baud) 1 micro	1 terminal	
Inuvik	1 modem(2400 baud)		1 terminal 1 modem 1 barcode reader		
Fort Smith			1 micro, 1 terminal 1 printer 2 modems(2400 baud) 1 barcode reader		
Cambridge Bay				1 modem(2400 baud) 2 terminals 1 b.c. reader 1 printer	
Communities			6 CD ROM drives 6 microcomputers	6 CD ROM drives 6 microcomputers or as required	6 CD ROM drives 6 microcomputers or as required

## APPENDIX I

## IMPLEMENTATION PLAN - NWTPLS

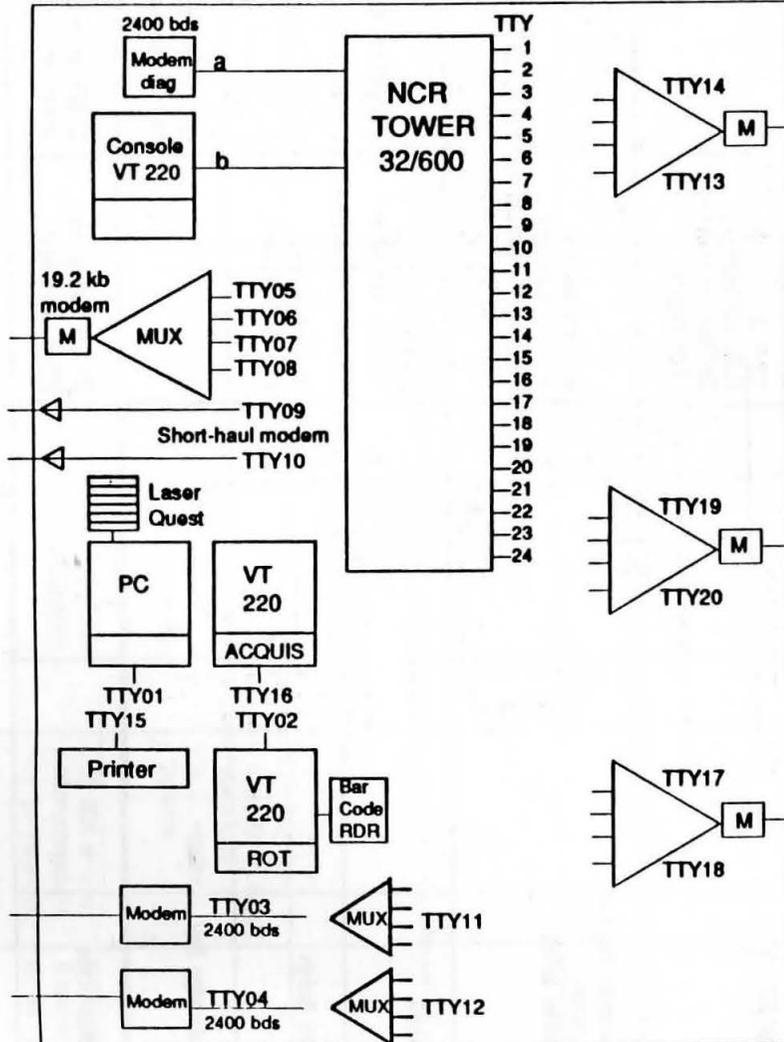
SOFTWARE

	Year 1 87-88	Year 2 88-89	Year 3 89-90	Year 4 90-91	Year 5 91-92
Headquarters Hay River	Recon of 100,000 titles Cataloguing Circulation On-Line cat. Laser Quest software LQ Interface	Collection Routing Acquisitions (end of 88) Inuktitut Language Interface	Serials		
NWT Centennial Library Hay River	On-Line Cat. (on-line with HQ)	(on-line with HQ)			
Government Library Yellowknife		(on-line with HQ)			
Yellowknife Public Library		(on-line with HQ)			
Baffin Regional Library Iqaluit			On-line access to H.Q. H.Q. software Collection routing for region		
Keewatin Regional Library Rankin Inlet			On-line access to H.Q. software Collection routing for region		
Inuvik			On-line access to H.Q. software	Collection Routing	
Fort Smith			On-line access to H.Q. software		
Cambridge Bay				On-line access to H.Q. software	
Communities			CD ROM access to union catalogue	CD ROM access to union catalogue	CD ROM access to union catalogue

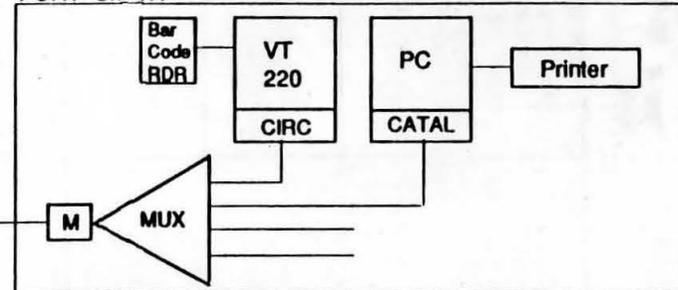
— 1989-90 —

NEW SITES

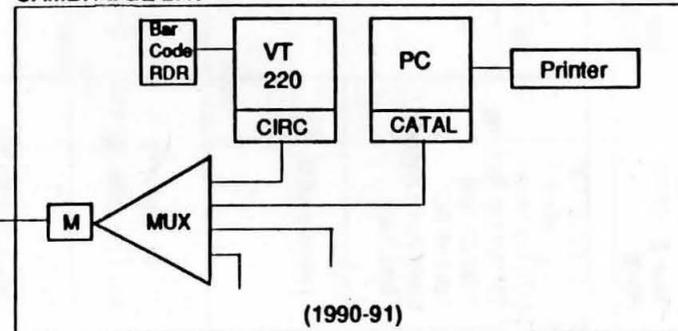
HAY RIVER HEADQUARTERS



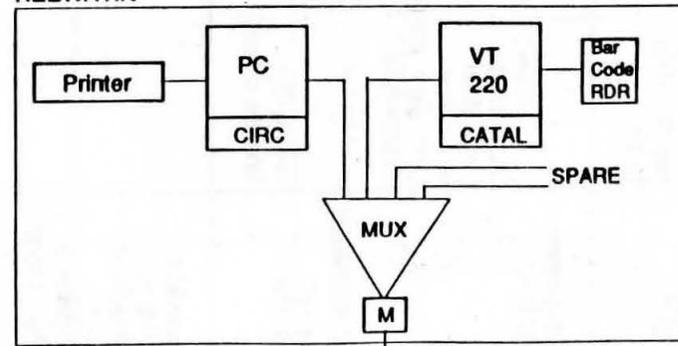
FORT SMITH



CAMBRIDGE BAY

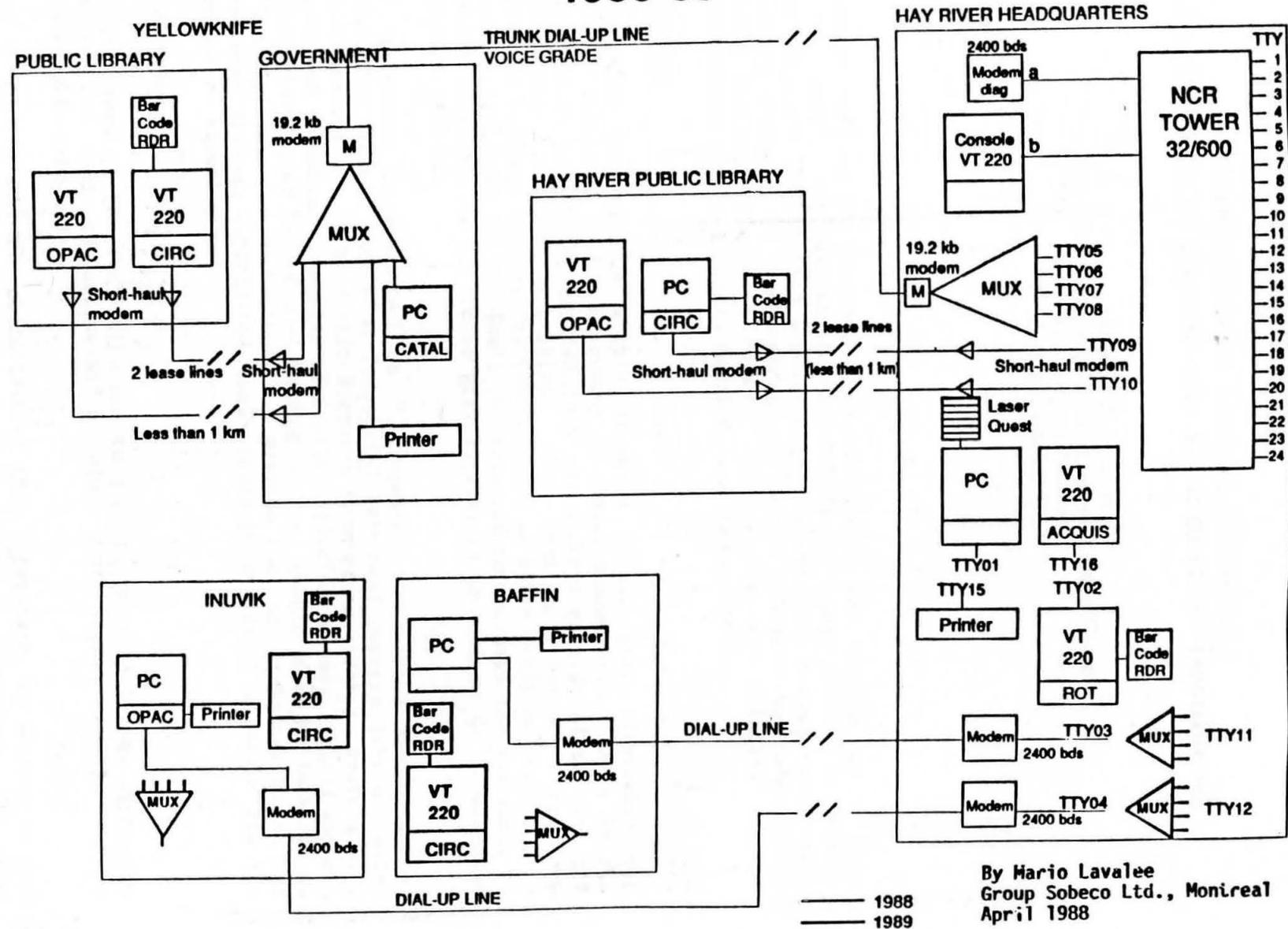


KEEWATIN



By Mario Lavalee  
Sobeco Group Ltd., Montreal  
Anril 1988

— 1988-89 —



By Mario Lavalee  
 Group Sobeco Ltd., Montreal  
 April 1988

# Arctic/Alaska Gray Literature: Evaluation of Access via Commercial Databases

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This paper reviews the findings of a study that was carried out by Rita Dursi as a part of the National Science Foundation funded project to develop a national arctic information network plan. It was done in conjunction with the larger analysis of the coverage of arctic subjects by commercially available bibliographic data bases. The studies are detailed in the project's final report (Hickok, Sokolov, and Dursi, 1987).

## The Problem

At Anchorage hearings on arctic research needs, gray literature was repeatedly mentioned in the testimony of Alaska researchers. Early in the network design project we learned that researchers outside Alaska did not consider gray literature a problem. (This came as a bit of a shock to someone who had been working for ten years at an agency that existed to help researchers deal with the problem!) We resolved to evaluate the question, to determine if there was an arctic gray literature problem or if it was only an Alaskan problem.

Gray literature is described as "...research information that goes no further than federal agency or industrial technical reports (the so-called gray literature)." (U.S. Arctic Research Commission, 1986.) State agency reports and consultant reports, typically delivered in very limited numbers and not distributed beyond the funding office, should also be included in the description. Let us begin with a premise that any technical report not distributed through established (and regularly utilized) channels has the potential of becoming gray.

## The Methodology

The first task of the evaluation was to identify potential gray literature examples and then to determine if they were listed in the various bibliographic data bases.

After struggling with the definition of gray literature, we decided to duck the issue and enlist the help of Alaska special librarians. We asked several to give us the citations for technical reports on their shelves that

they considered important in their subject field, and that they suspected were not listed on subject data bases. We compiled a list of 114 technical report titles, including reports that were authored, published, or funded by federal or state agencies; reports done by, or for, industry; conference or workshop proceedings; arctic reports by Canadian government entities and a number with unknown sponsorship. Remember, they came from library shelves, and may or may not fit a definition of gray literature. They do however represent the entire spectrum from monographs to the dingiest of gray. (Significantly the very titles objected to by reviewers as not being "gray" were indeed the titles most often found on the data bases--proving that we had identified the boundary between gray and non-gray.)

Each title was assigned to one or more of the discipline categories used in the bibliographic database analysis. These disciplines were used in a recent listing of federal arctic research programs (Interagency Arctic Research Policy Committee, 1985). Titles from appropriate categories in this list were included in evaluating each of the subject data bases. The reports were searched for by significant words in their titles, and the titles of any hits were listed to make certain that the correct report had been recovered. (A list of the titles used and the ratio of hits to searches is appended to this paper.) Each data base was searched only in categories appropriate to its published description. NTIS, which covers all subjects, was included in all nine categories, other data bases were evaluated in from one to four categories. A total of 72 titles were searched for on 22 data bases. Some titles were included in more than one subject category and were inadvertently searched for more than once on the same data base. Disallowing duplicates, a total of 471 unique searches were conducted. There were 53 successes in the 471 searches for an overall success rate of 11.25 percent.

### The Findings

Figure 1 rather graphically illustrates the results. COLD had by far the best coverage, with a success rate of 58 percent in 24 searches. GEOREF was second with hits for approximately one-third of the titles sought.

NTIS, a data base developed to cover the federal technical report literature, had a success rate of only 25 percent. Of the 38 reports produced or funded by the federal government, only 16, a disappointing 42 percent were listed on NTIS. Clearly, all federal arctic reports are not on NTIS.

Since the report was published we have had the opportunity to look at the coverage by ASTIS, the Canadian arctic data base produced by the Arctic Institute of North America. Since it is a cross-disciplinary data base, we checked all 72 titles, and got 20 successful hits, two more than were on NTIS.

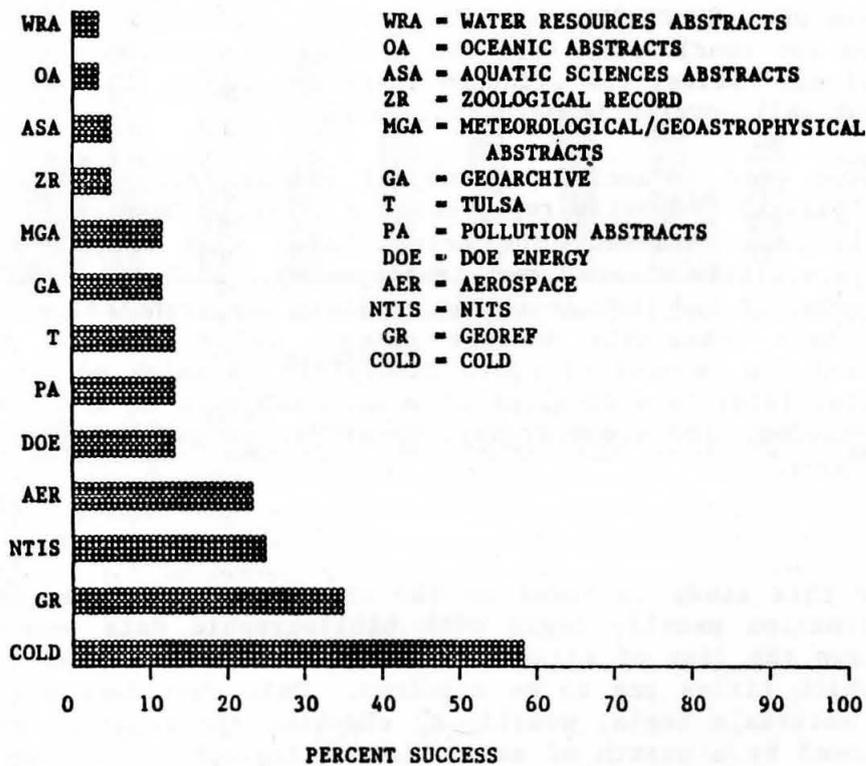


Figure 1. Success rates in retrieving gray literature titles from bibliographic databases (ranked by percent successful searches).

More revealing than the success rates (Figure 2) was the complete failure of some of the better known bibliographic data bases to include arctic gray literature titles--even when the published descriptions claimed to cover technical literature. For example, BIOSIS is described to cover "selected institutional and government reports"; 42 searches, no titles found. (Perhaps they are selecting out arctic literature.) ENVIROLINE, says it includes "documents and research reports from private and governmental agencies..."; 34 searches, no titles found. Other data bases had equally poor showings, but their published descriptions did not claim to cover technical report literature (e.g., ENVIRONMENTAL BIBLIOGRAPHY, 34 unsuccessful searches, COMPENDEX, 25 unsuccessful searches). While it is not wise to draw any conclusions from the results of unsuccessful searches for only five or six titles, the evidence is pretty strong that arctic gray literature is not well covered in most data bases.

The success rates when evaluated by subject fields (Figure 3) are also revealing. The size of the boxes represent the possible number of hits per subject, and the bars represent the actual hits. The subject coverage analysis makes it a little clearer what is happening. COLD and GEOREF cover permafrost and snow/ice and they seriously go after the technical materials. Those subjects have reasonable success rates. While I'm not sure we adequately checked the subject of upper atmosphere, I think we can safely say that technical literature coverage of arctic subjects in the fields of energy, marine ecology and oceanography, water resources, and terrestrial ecology is very poor.

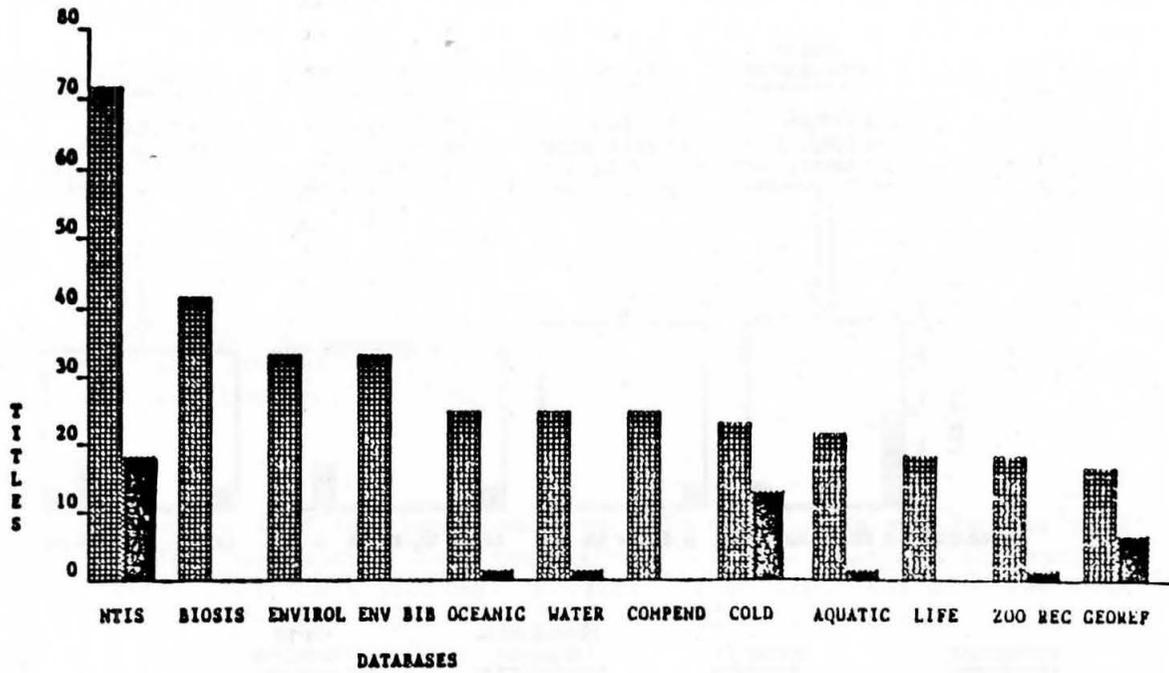
### The Discussion

Our premise for this study is based on the observation that searches for scientific information usually begin with bibliographic data bases. The researcher reviews the list of citations obtained in the database searches and indicates which titles are to be acquired. Only then does the actual search for the materials begin, usually by checking the holdings of local libraries, followed by a search of available bibliographic utilities. The key here is that if the title doesn't show up on printout of the bibliographic database search results, it is not requested.

Limitations on bibliographic utilities (and library card catalogs) discourage approaching their files directly. First, there must be access, and this access must include the means to identify the title in terms relevant to the researcher's needs. OCLC cannot be searched by subject, RLIN is not available (for whatever reason) in many areas, and WLN has been restricted geographically. Even in Alaska, where WLN is a major resource, many special libraries have had only access to the data base via microfiche. Microfiche is not conducive to subject searching. For these reasons bibliographic utilities are not usually the first sources checked.

After the final report was issued and, in response to the charge that the problem was an Alaskan problem, I counted the Alaska specific titles in the sample of 72. Only two-thirds were specific to Alaska. While the test is

SEARCHES/HITS % SUCCESS	72/18 25%	42/0 0%	34/0 0%	34/0 0%	25/1 4%	25/0 0%	24/14 58%	22/1 5%	22/1 4.5%	19/0 0%	9/0 0%	17/6 35.3%
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SEARCHES/HITS % SUCCESS	17/4 23.5%	17/2 11.8%	17/2 11.8%	11/0 0%	11/0 0%	8/1 12.5%	8/1 12.5%	8/1 12.5%	8/0 0%	8/0 0%
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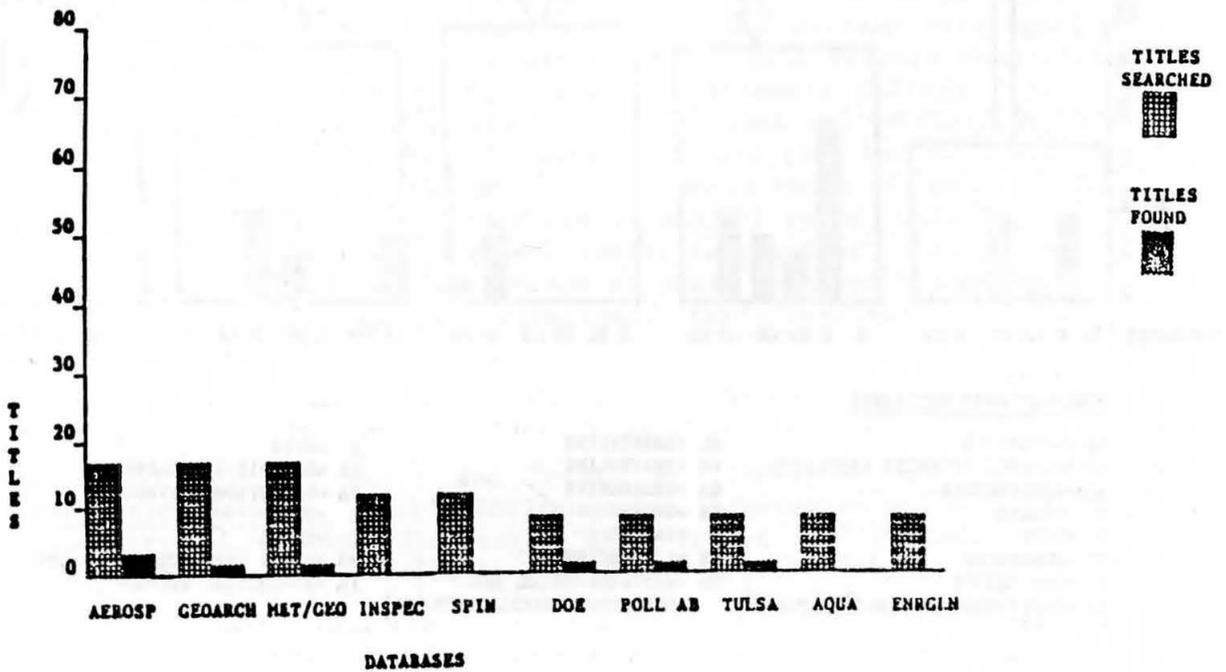


Figure 2. Success rates in retrieving gray literature titles from bibliographic databases (ranked by number of searches).

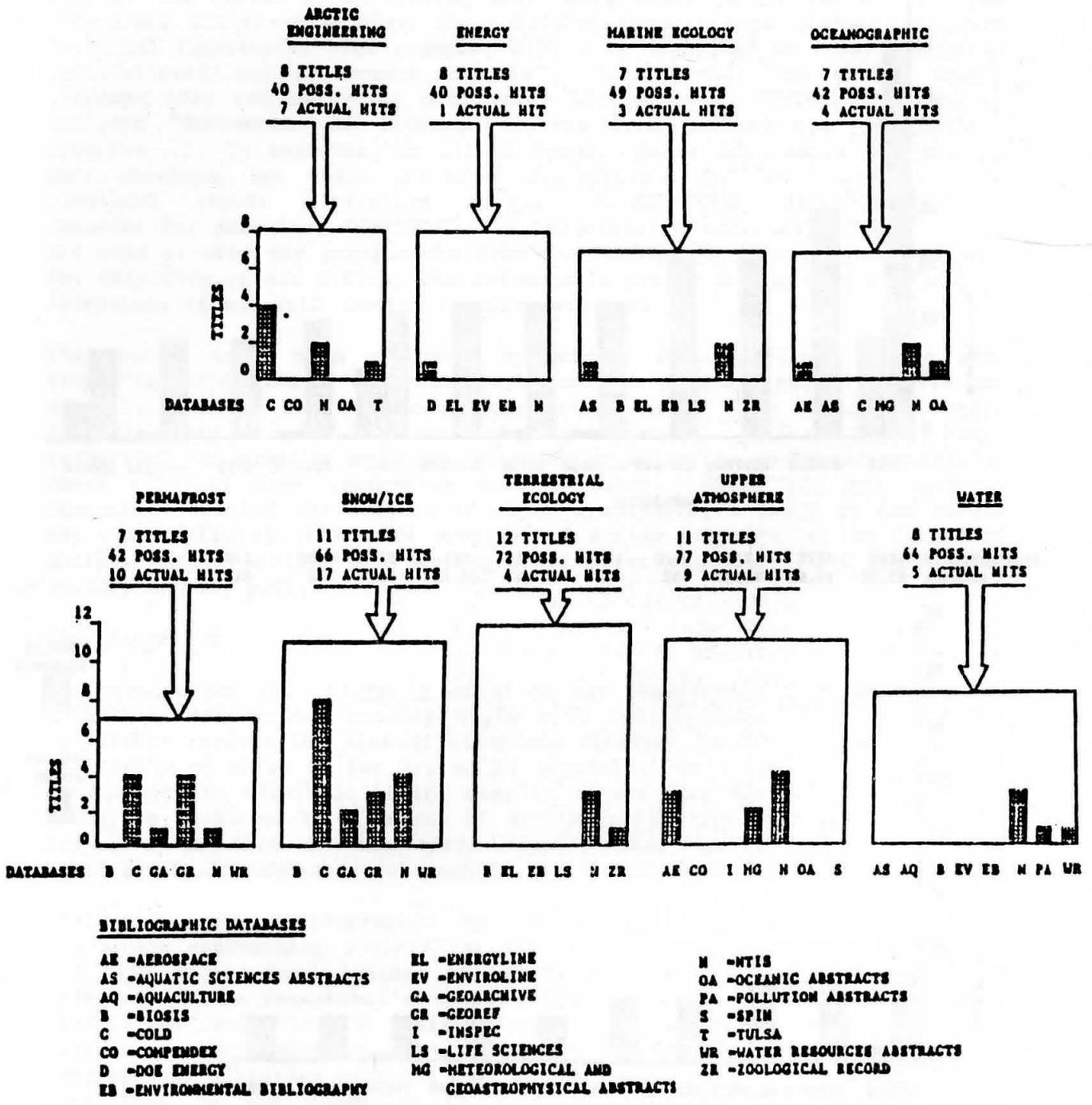


Figure 3. Success rates in retrieving gray literature titles from bibliographic databases by subject categories.

clearly biased toward Alaskan gray literature, the results show it is not just an Alaskan problem.

We heard earlier this week the objections by Dr. Roederer to using the peer reviewed literature in his fast moving field of space research. There is another very different reason to take the problem seriously. The agency that sponsors the study probably uses it. The technical reports that become gray literature are very often the basis of management decisions. If these reports are not available, no review is possible. No one can evaluate the research or conclusions that served as the basis for decisions. It is not for us to judge the contents of these technical reports, but it is most certainly our charge to make them available to the researchers who can. Ignoring the gray literature is a form of censorship with implications that go far beyond intellectual freedom.

### The Solution

Finally, because of what has happened here this week, this may be the most personally satisfying paper I have ever given. I came prepared to convince you of the seriousness of a problem. However, if an idea that surfaced this week at Colloquy is implemented, I believe that we will have gone a long way to finding a solution to that very problem.

As pointed out earlier, the titles in this evaluation came from library shelves. We understand that Rasmuson Library had 80+ percent of the titles on the list and that the Boreal Institute holds more than 40 percent. In fact, many, if not most gray literature titles, are already catalogued by Rasmuson Library and are on the WLN data base (or OCLC through the federal Alaska Resources Library or on RLIN through Dartmouth College Library). Discussions this week have led to the realization that the holdings of these libraries could be added to the COLD data base, and thus become accessible to us all. The prospect is very exciting, and while there are many problems to be worked out (duplicates, differences in subject terms, updating, etc.) a large arctic data base should be much easier to clean up, than to create. I believe we would all rather have access to these combined resources, even if it means getting some duplicate citations. Let's hope that this idea is implemented quickly.

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\* (The details of this gray literature study are given in Volume 2, Appendix 3. The analysis reviewed here is on pages 58 through 63 of Volume 1.)

volume, or in paper copy at: Vol. 1, \$10.00; Vol. 2, \$15.00; Vols. 1 & 2, \$20.00)

Interagency Arctic Research Policy Committee (1985), Federal arctic research; detailed listing of existing U.S. programs. Initial compilation, 136 pp.

U.S. Arctic Research Commission (1986), U.S. on the Arctic rim; Report of the U.S. Arctic Research Commission to the President and the Congress of the United States of America. U.S. Arctic Research Commission, Los Angeles, CA, 33 pp.

## APPENDIX

## TECHNICAL REPORT TITLES

The following list of technical report titles was compiled and used for the evaluation of bibliographic database coverage of arctic technical report literature. Seventy-two of these 118 titles were used in the analysis.

The codes indicate geographic coverage, federal involvement, and a ratio showing successful searches (AK = Alaska specific; N = Nonspecific geographically; F = Federal report; Ff = Federal funding; and Number of hits/Number of databases searched). The ordinal numbers were used as reference in the original network report, and are retained for cross-reference. Titles without any coding were not used.

- N - 0/6 1  
MacNeill, M.R., and J.F. Garrett. 1975. Open water surface currents. Canada Dept. of the Environment, Victoria, BC. Beaufort Sea Project Technical Report 17. 113 pp.
- AK F 3/5 2  
Dennis Dooley and Associates. 1978. Beaufort Sea petroleum development scenarios, transportation impacts. U.S. Bureau of Land Management, Anchorage, AK. Alaska OCS Socioeconomic Studies Program. Technical Report 20. 163 pp.
- AK F 0/6 3  
Han-Padron Associates. 1985. Beaufort Sea petroleum technology assessment. U.S. Minerals Management Service. Alaska OCS Socioeconomic Studies Program. Technical Report 112. 640 pp.
- 4  
U.S. Minerals Management Service, Alaska OCS Region. 1983. Proposed Navarin Basin lease offering (March 1984). Draft EIS. Anchorage, AK. 245 pp.
- AK F 0/6 5  
U.S. Minerals Management Service, Alaska OCS Region. 1983. Proposed Navarin Basin lease offering (March 1984). Final EIS. Anchorage, AK. 300 pp.
- N 0/6 6  
Rosenegger, L.W. 1975. Movement of oil under sea ice. Canada Dept. of the Environment, Victoria, BC. Beaufort Sea Project Technical Report 28. 81 pp.
- AK 0/7 7  
Raymond, J.A., M. Merritt, and C. Skaugstad. 1984. Nearshore fishes of Kotzebue Sound in summer. FRED Div., Alaska Dept. of Fish & Game, Juneau, AK. FRED Report 37. 30 pp.
- N 0/7 8  
Hauser, W.J., and A.L. Howe. 1985. Regeneration of clipped fins of sockeye salmon (*Oncorhynchus nerka*) fry. FRED Div., Alaska Dept. of Fish & Game, Juneau, AK. FRED Report 49. 22 pp.
- AK 0/8 9  
Zemansky, G.M., T. Tilsworth, and D.J. Cook. 1976. Alaska mining and water quality. Institute of Water Resources, University of Alaska, Fairbanks, AK. Report IWR-74. 113 pp.
- AK Ff 2/8 10  
University of Alaska, Institute of Water Resources. 1979. Alaska mining and water quality. Proceedings of the Symposium, April 9, 1976. Report IWR-93. Funded in part by Office of Water Research & Technology, U.S. Dept. of the Interior. 82 pp.
- AK 0/6 11  
Alaska Consultants. 1983. City of Barrow, background for planning. Anchorage, AK. Report for North Slope Borough. 159 pp.

- AK 0/6 12  
Mills, D., et al. 1984. Salmon use by the residents of the Chilkat and Chilkoot River drainages. Subsistence Div., Alaska Dept. of Fish & Game, Juneau, AK. Technical Paper 95. 83 pp.
- AK 0/6 13  
Hartman, C.W., and P.R. Johnson. 1984. Environmental atlas of Alaska. Institute of Water Resources, University of Alaska, Fairbanks, AK. 95 pp.
- N 3/9 14  
Williams, P.J. 1979. Pipelines and permafrost: physical geography and development in the circumpolar north. Longman Group Limited, London. Topics in Applied Geography. 98 pp.
- N F 2/5 15  
Woodward-Clyde Consultants. 1980. Gravel removal guidelines manual for arctic and subarctic floodplains. Office of Biological Services, U.S. Fish & Wildlife Service, Anchorage, AK. FWS/OBS-80/09. Report for the Biological Services Program. 169 pp.
- AK F 2/6 16  
Brown, J., and R.A. Kreig, eds. 1983. Guidebook to permafrost and related features along the Elliott and Dalton highways, Fox to Prudhoe Bay, Alaska. Proceedings of the International Conference on Permafrost, 4th, University of Alaska, Fairbanks, AK. 230 pp.
- AK Ff 2/11 17  
LaBelle, J., and J.L. Wise. 1983. Alaska marine ice atlas. Arctic Environmental Information & Data Center, University of Alaska-Fairbanks, Anchorage, AK. Funded in part by Maritime Administration, U.S. Dept. of Transportation; Office of Management & Planning of Fossil Fuels; U.S. Dept. of Energy; Minerals Management Service, U.S. Dept. of the Interior; State of Alaska; and Arctic Environmental Information and Data Center, University of Alaska-Fairbanks. 302 pp.
- N F 3/6 18  
World Data Center A, Glaciology. 1982. Workshop proceedings: radio glaciology ice sheet modeling. Glaciological data. Boulder, CO. Report GD-13. 87 pp.
- AK F 4/6 19  
Hood, D.W., and J.A. Calder, eds. 1981. The eastern Bering Sea Shelf: oceanography and resources. U.S. National Oceanic & Atmospheric Administration, Washington, DC. 1337 pp.
- AK Ff 3/6 20  
Muench, R.D., and G.M. Schmidt. 1975. Variations in the hydrographic structure of Prince William Sound. Institute of Marine Science, University of Alaska, Fairbanks, AK. Funded in part by National Science Foundation and Office of Sea Grant, National Oceanic & Atmospheric Administration, U.S. Dept. of Commerce. IMS Report R75-1. 135 pp.
- N 1/7 21  
Weller, G., and S.A. Bowling, eds. 1975. Climate of the Arctic. Proceedings of the Alaska Science Conference, 24th, Fairbanks, AK, August 15-17, 1973. American Association for the Advancement of Science and American Meteorological Society. 436 pp.
- AK Ff 3/7 22  
Brower, W.A., H.W. Searby, and J.L. Wise. 1977. Climatic atlas of the outer continental shelf waters and coastal regions of Alaska. Vol. 3. Chukchi and Beaufort Seas. Arctic Environmental Information & Data Center, University of Alaska-Fairbanks, Anchorage, AK. Report for Outer Continental Shelf Environmental Assessment Program, National Oceanic & Atmospheric Administration, U.S. Dept. of Commerce and funded by Bureau of Land Management, Dept. of the Interior. 409 pp.

- AK 0/5 23  
Evans, C.D., et al. 1978. Environmental review of summer construction of gravel islands: Sag Delta No. 7 and No. 8, Stefansson Sound. Arctic Environmental Information & Data Center, University of Alaska-Fairbanks, Anchorage, AK. Report for Sohio Petroleum Co. 173 pp.
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- AK Ff 0/6 25  
Center for Northern Studies. 1974. The environment of the Noatak River Basin, Alaska. Wolcott, VT. Contributions from the Center for Northern Studies 1. Funded by National Park Service, U.S. Dept. of the Interior. 584 pp.
- AK F 0/8 26  
Mellor, J.C. 1983. Upper Colville River channel depth survey, July 1979. U.S. Bureau of Land Management, [Anchorage], AK. Open File Report 1A. 16 pp.
- 27  
Smith, H.L. 1983. Archaeological investigations in the DeLong Mountains, northwest Alaska, 1979-1980. U.S. Bureau of Land Management, [Anchorage], AK. Open File Report 2. 26 pp.
- AK F 0/6 28  
Silva, J.B. 1985. The 1983 peregrine falcon/raptor survey along the Utukok and Sagavanirktok rivers. U.S. Bureau of Land Management, [Anchorage], AK. Open File Report 11. 19 pp.
- AK F 0/6 29  
Swem, T., B. Dittrich, and J. Silva. 1983. The 1982 peregrine falcon/raptor survey in the central arctic, Alaska. U.S. Bureau of Land Management, [Anchorage], AK. Open File Report 7. 43 pp.
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University of Alaska, Arctic Environmental Information & Data Center and Institute for Social & Economic Research. 1974. The Bristol Bay environment, a background study of available knowledge. Anchorage, AK. Report for Alaska District, U.S. Army Corps of Engineers. 858 pp.
- AK 0/6 31  
Alaska Dept. of Fish & Game, Div. of Habitat. 1985. Alaska habitat management guide. Southwest region. Vol. 1. Juneau, AK. 545 pp.
- AK 0/7 32  
Albert, T.F., J.J. Kelley, and R. Dronenburg. 1982[?]. Proceedings of the 1st Conference on the Biology of the Bowhead Whale, *Balaena mysticetus*: Population Assessment, Anchorage, AK, January 25-29, 1982. Alaska Eskimo Whaling Commission, Barrow, AK. 252 pp.
- AK F 0/6 33  
Preston, J.E., et al. 1977. Range sites and soils of the Kotzebue Sound area. U.S. Soil Conservation Service, Portland, OR. 64 pp.
- AK F 0/8 34  
Elliott, G.V. 1982. Evaluation of stream crossings and effects of channel modifications on fishery resources along the route of the Trans-Alaska Pipeline. U.S. Fish & Wildlife Service, Anchorage, AK. 110 pp.
- N Ff 0/5 35  
Hoag, S.H. 1976. The effect of trawling on the setline fishery for halibut. International Pacific Halibut Commission, Seattle, WA. Scientific Report 61. 20 pp.

- AK Ff 1/7 36  
Melteff, B.R., and V.G. Wespestad, eds. 1980. Proceedings of the Alaska Herring Symposium, February 19-21, Anchorage, AK. Sea Grant College Program, University of Alaska, Fairbanks, AK. 274 pp.
- N F 1/7 37  
Livingston, P.A., and B.J. Goiney. 1984. Bibliography on daily food ration of fishes. U.S. National Marine Fisheries Service, Seattle, WA. NMFS F/NWC-63. 60 pp.
- N Ff 0/6 38  
Triplehorn, J.H., and L.E. Johnson. 1980. MuskoX bibliography. Institute of Arctic Biology, University of Alaska, Fairbanks, AK. Occasional Publications on Northern Life 3. Funded by National Science Foundation. 217 pp.
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Severinghaus, N.C. 1979. Selected annotated references on marine mammals of Alaska. Northwest & Alaska Fisheries Center, U.S. National Marine Fisheries Service, Seattle, WA. Report for Outer Continental Shelf Environmental Assessment Program. 178 pp.
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- AK Ff 0/5 50  
LaBelle, J.C. 1973. Fill materials and aggregate in the Cape Halkett region. Naval Petroleum Reserve No. 4, Alaska. Arctic Institute of North America, Washington, DC. 52 pp.
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Lynch, D.F., et al. 1976. Constraints on the development of coal mining in arctic Alaska based on review of Eurasian arctic practices. Mineral Industry Research Laboratory, University of Alaska, Fairbanks, AK. Report for U.S. Bureau of Mines. 219 pp.
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Clark, P.R. 1973. Transportation economics of coal resources of northern slope coal fields, Alaska. Mineral Industry Research Laboratory, University of Alaska, Fairbanks, AK. MIRL Report 31. Funded in part by the U.S. Bureau of Mines. 134 pp.
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Dames & Moore. 1981. Assessment of coal resources of northwest Alaska, Phase 2. Vol. 3: Assessment of the feasibility of utilization of coal resources of northwestern Alaska for space heating and electricity. Report for the Alaska Power Authority. 100 pp.
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- AK F 1/6 56  
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- AK 0/5 60  
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- AK 0/8 61  
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Alaska Water Study Committee. 1977. Specific problem analysis summary report, 1975 National Assessment of Water and Related Land Resources. Juneau, AK. 184 pp.
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- AK 2/6 65  
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# **Preliminary Evaluation of the Polar Regions Monographic Collection of the Rasmuson Library, University of Alaska Fairbanks**

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## **Abstract**

The polar regions book collection of the Rasmuson Library has approximately 100 thousand volumes containing 75 thousand titles. These were counted utilizing a draft Polar Regions Conspectus based on a concept originated by the Research Libraries Group in the U.S. Statistics were obtained by Library of Congress subject class and language, and then evaluated with modified RLG criteria for estimating level of comprehensiveness.

Data suggest that the total body of published Alaskan approaches 55 thousand titles. The Rasmuson Library's Alaska Collection nearly encompasses this number while other large collections are in the Alaska State Library, Juneau and the University of Alaska Anchorage Consortium Library.

Linguistically, the collection includes nearly all commercially published English language monographs on the North and Antarctica. Russian language texts are second only to English, particularly in polar exploration, Russian American history, and geology. Danish, German, French, Eskimo (Inuit) and other languages are present in lesser but important quantities.

In terms of the RLG rating scale of 1 to 5, this polar regions collection is comprehensive (5) in Alaskan materials and polar exploration. It meets or approaches research quality (4) on northern Canada, Greenland, and Antarctica. Some subjects, such as geology and native (aboriginal) languages of Siberia are at an advanced study level (3). The collection is weakest in selected subjects on the Soviet North and northern Scandinavia in general.

## Introduction

The Elmer E. Rasmuson Library has a major interest in polar regions by virtue of its geographic location, research interests of its university faculty, and United States government interests in polar regions. The Library's collections reflect the very recent history of the University of Alaska, established as a land grant college in 1922 and then as a university in 1936. Until the end of World War II, it was a very small institution in terms of academic programs, faculty, students, facilities, and budgets. Rapid expansion in all of these areas began after 1965 and has continued to the present.

The Rasmuson Library's special body of polar regions materials, named the Alaska Collection, began to develop exponentially after 1970. Growth followed expanded budgets and the addition of library professionals with responsibility for acquisitions and bibliographic control of polar materials. The primary criteria for inclusion of materials in the Alaska Collection is geographic. Attempts are made to acquire all published monographs about Alaska, Canada north of 60 degrees, Greenland, the northern provinces of Norway, Sweden and Finland, as well as northern portions of the Soviet Union - especially Siberia. The Arctic Ocean and Antarctica, together with their associated islands and seas, are included. The collection also contains a wide variety of journals, newspapers, pamphlets and reprints which have not yet been examined sufficiently to be included in this preliminary report.

In 1973, the Alaska collection contained 7,000 volumes and now has about 75,000 monographic and serial titles. Since the Eleventh Colloquy in Lulea two years ago, 8783 cataloged titles have been added to the collection and suggests that, every two years, the collection expands by a number greater than that which comprised the entire collection fifteen years ago.

Like many collections which have experienced exponential growth, it has been difficult to assess the quality and quantity of the rapidly developing Alaska collection. Growth is thought to have been uneven, tending to follow wider influences throughout society, such as report productivity related to major northern construction projects, governmental assessments of arctic and subarctic environments, and such private sector activities as development of the petroleum industry in the North.

Like other libraries, Rasmuson has found that geographic parameters used as acquisition guidelines do not easily lend themselves to analysis by subject content. However, the Research

Libraries Group(RLG) has developed a statistical approach to analysis and assessment of collection strengths and weaknesses which has proven very useful to many libraries. The RLG conspectus has been modified for assessment of collections in many types of libraries in Alaska and the Pacific Northwest. The Alaska Conspectus program has been previously described at the St. John's and Lulea meetings of the Northern Libraries Colloquy (Innes-Taylor; Stephens, 1984) and elsewhere (Stephens, 1986). Readers who want to become more familiar with this modified RLG program should consult Colloquy proceedings or other published reports (Stephens; Innes-Taylor, 1986)(Stephens 1986). The Alaska Conspectus is part of the Pacific Northwest Conspectus under development for the Pacific Northwest region of the United States.

This preliminary paper is the third in a series of reports regarding ongoing efforts to evaluate strengths and weaknesses of the polar regions collection (West; Lincoln 1986)(Lincoln; West 1986). It is limited to monographic titles and serials treated as monographs and/or physically housed with books in the Alaska Collection. Thus periodicals, newspapers, pamphlets, reprints, film products, and archival resources are presently excluded. However, since these are a part of any full and complete conspectus assessment, they will eventually be evaluated for inclusion in a final report which will encompass the entire collection.

### Methodology

To assess the polar collections of the Rasmuson Library, the RLG Conspectus as modified for the Alaska Conspectus project was utilized. Since the RLG had developed no conspectus segment based upon polar regions geography, a conspectus segment for Alaska libraries had to be developed. This Polar Regions Conspectus is the result of several years of work by Cathie Innes-Taylor of the University of Alaska Anchorage Consortium Library.

An example of a conspectus assessment worksheet from this draft polar conspectus for libraries using the Library of Congress classification system is presented in Table 1. These worksheets are divided into columns which provide a space for insertion of data during the assessment process. A column for comments is also provided. Any or all of the following criteria for assessing collections may be included in tabular form on the assessment conspectus worksheets: chronological coverage; principal authors; principal works; primary sources; criticism; commentary; interpretation; complete sets; periodical coverage; number of volumes; and circulation data. Language coverage codes may also be added (Lincoln; West, 1986).

The RLG Conspectus system and its Alaska modification, use a rating system of 0 to 5 to evaluate comprehensiveness of collection with 5 indicating the most comprehensive collection or subject area. These numerals represent both existing collection strengths, and current collecting intensities or acquisition goals for a specific collection or subject. For more information regarding the RLG evaluation scale and language code system as well as the Alaska modification of the scales, readers should consult Guinn; Mosher (1983) and Stephens (1986).

A physical shelf count of Alaska Collection monographs was the first step in determining the number of titles owned in each category specified in the Polar Regions Conspectus. This title count was supplemented with several techniques for determining the number of titles under certain geographic entities which were thought to be of special interest to Northern Libraries Colloquy participants, i.e., Greenland. Techniques that have augmented the physical count of titles held in certain geographic regions, included shelf list records, and the use of machine readable bibliographic data bases to obtain statistics by LC subjects and/or dates. However, gathering statistics for the partially processed in-house collection required physical examination of each and every volume of the 16 thousand owned.

The reader is reminded that this preliminary report does not include consideration of all the possible criteria for assessment of collections. When completed, the final Polar Regions Conspectus assessment of the Alaska Collection will include the full range of materials and evaluation criteria.

### Research Results

Table 2 presents a summary of statistical results of the count of titles in the Alaska collection. The reader can easily identify number of titles owned within each LC class reported in the table. The 43,726 titles reported result from actual shelf count of monographs and serials housed with monographs. This figure does not include approximately 8,064 titles of National Technical Information Service (NTIS) fiche in Rasmuson's Government Documents collection as well as an estimated 10,000 additional Alaska subject titles housed in Documents. Nor does it include some 12,800 titles of Alaska court briefs, 3,210 rare books, and 16,861 monographs in the partially processed in-house collection. When combined, the total number of titles in the Library's several polar regions collections is conservatively estimated to be about 75,000 titles and well over 100,000 volumes.

Also located on the UAF campus is the Alaska Native Language Center library which is not part of the Rasmuson Library system. This research and archival collection houses about 7,000 items of

Table 1: Sample page of the Polar Regions Conspectus

DRAFT: 2/1/88		POLAR REGIONS CONSPECTUS		INSTITUTION:
LC CLASS EQUIV.	SUBJECT GROUP	CL	AC	COMMENTS
- QK51-62	Study and Teaching. Research.			
QK109-203	America			
QK474	Arctic Regions			
QK710-899	Plant Physiology			
QK902-946	Plant ecology			
QK977	Arctic regions			
QL	Zoology			
QL15-58	General Works			
QL101-106	Geographical Distribution. Polar Regions			
QL150-221	Topographical Divisions (Faunas) America			
QL614-654	Fishes			

Table 2: Alaska Collection Monographs & Serial Titles.

LC Class	Subject	Number Titles
A	General Works	279
B	Philosophy, psychology, religion	272
C	Auxiliary Sciences of History	87
D	History: General & Old World	1605
E	History: America	2670
F	Alaska (F901-F3313)	2560
G	Geography	7858
H	Social Sciences	5782
J	Political Science	1550
K	Law	1133
L	Education	2077
M	Music	34
N	Fine Arts	164
P	Language & Literature	2287
Q	Science	7197
R	Medicine	677
S	Agriculture	3262
T	Technology	3697
U	Military Science	122
V	Naval Science	148
Z	Bibliography, library science	265
Total		43726

virtually everything written in or about Alaska Native languages as well as significant publications about related aboriginal languages outside of Alaska. Of special interest are the Soviet Siberian Yupik Eskimo books and holdings of Soviet publications on Siberian Yupik and Aleut. Dr. Michael Krauss, Director of ANLC, recently reported that the collection holds approximately 400 titles published in the Greenlandic Inuit language (Personal communication). It is believed that most of these are not duplicated in the Rasmuson polar collections which contain an additional 355 books in the Greenlandic Inuit language.

An effort has been made to determine the total published record of Alaskana currently in existence. About 12,200 titles of the 43,726 counted in the Alaska Collection are polar related and when excluded, would reduce the Alaskana titles to 31,526. However, approximately 12,000 titles of Alaskana are in Rasmuson's in-house collection and were not included in the shelf count. When they are added to it, the Alaskana total approaches 43,526; to this should be added 8,064 NTIS fiche titles and the 3,210 rare books producing a maximum total of 54,800 Alaskana titles. This figure suggests that the published record of Alaskana is currently about 55,000 titles. Alaska court briefs, for this exercise, have been treated as serials and have not been included.

A comparison of number of titles reported for each of the three largest Alaskana collections in the state, provides an additional indication of the published record of Alaskana. The Alaska State Library in Juneau has 33,000 titles, the University of Alaska Anchorage Consortium Library owns 27,250 titles, while Rasmuson has about 55,000 Alaskana titles. The greater number of titles owned by Rasmuson probably results from two factors. Figures reported for the Alaska State Library and the University of Alaska Anchorage may not include in-house collections of unprocessed materials, while the Rasmuson statistic does include them. The first two collections also limit acquisitions to Alaskana published in English, unlike Rasmuson's multi-lingual polar regions collection.

With its broader collecting parameters Rasmuson's Alaska Collection is known to include circa 4,000 titles about Siberia, some 2,000 titles about Greenland, approximately 1,200 titles on Antarctica, as well as an uncertain quantity about Canada currently estimated at 5,000 titles. The total of 55,000 titles owned by Rasmuson may approximate the potential published record. Titles for most classes of Alaskana reported in Table 2 may also approach the published record but do not include materials not fully processed into the Library of Congress system. Additionally, the Alaska State Library is thought to contain more Alaska state document publications than Rasmuson, since under

Alaska statutes first copy deposit resides with the State Library.

A physical examination and title count of the partially processed in-house collection of 16,861 monographs has provided new insight into title holdings for specific geographic regions. The in-house collection presently contains 763 Greenland titles, 1,201 Canadiana, 2,270 on Siberia and 200 about Antarctica. Presumably the vast majority of the remaining 12,424 titles are Alaska related.

The title count by LC class did allow for some comparisons to be made of holdings in broad subject categories. Since much of the emphasis at this Colloquy has been concerned with the physical and biological sciences, it seemed appropriate to compare Alaska Collection holdings in the sciences with the social sciences and humanities. This comparison indicates that 58.4 % of the collection is humanities and social sciences, or 25,557 titles; and 41.6% is sciences/technology and 18,169 titles. These figures are, of course, subject to some interpretation but every effort was made to include LC categories, such as hydrology in class G, in the appropriate science/technology group.

The science/technology figure of 18,169 in the Alaska Collection was also compared with other Alaska libraries whose special mission orientation is the biological and physical sciences. The Biomedical branch collection of the Rasmuson Library contains 26,107 monographic and periodical titles wholly in the life sciences. BLM's Alaska Resources Library in Anchorage holds 17,500 titles (As reported by their bibliographic utility, OCLC). The Alaska Fish and Game Library has 3,818 holdings on the WLN bibliographic utility and the Geophysical Institute Library reports 7,116 titles on WLN.

It would appear from this comparison that the Rasmuson Library system holds the two largest science collections in Alaska: namely, the Biomedical Collection and the Alaska Collection. The combined total of the next three largest science collections in Alaska appear to be not too much larger than either of the two Rasmuson Library collections. While the Geophysical Library is not part of the Rasmuson Library system, its collection is also housed on the UAF campus.

An initial evaluation of Rasmuson monographic holdings based on the RLG and Alaska Conspectus rating scale of 1 to 5 resulted in a comprehensive score of (5) for Alaskan materials and polar exploration materials. It approaches research quality (4) on northern Canada, Greenland and Antarctica. Some subjects, such as geology and native languages of Siberia are at the advanced study level (3). The collection is weak in selected subjects

on the Soviet North and about northern Scandinavia in general. Non-English language holdings continue to be weak and are a focus of current acquisitions in the Alaska Collection.

This preliminary report gives only the most basic sketch of a continuing critical analysis and evaluation of the several polar regions collections of the Rasmuson Library. Research and analysis are ongoing and a complete evaluation will be forthcoming. The final report will include not only periodicals, newspapers, pamphlets, film products, and archival materials, as previously noted, but an evaluation rating as defined by the Alaska Conspectus Program for all holdings in comparison to collecting goals.

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# The Organization of Polar Information Before the Advent of Online Databases: A Review of the Literature

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## Abstract

A review of the literature regarding the organization, storage, and retrieval of polar information is presented. The 89 references discussed are divided into three time periods covering the years from 1945 through 1978. The evolution of bibliographic services from the library shelf and printed index to the online database is followed, with emphasis on the cooperation among polar information providers and users which has made these services successful.

## Preface

The organization of polar information occupies a very specialized niche in the discipline of library and information science. Since at least the 19th century, the polar regions have attracted bibliographic attention as a regional topic, thereby differing from the traditional approach to bibliography through subject discipline or national bibliography (see works cited in Dutilly, 1945).

Although, to some extent, the present paper deals with the bibliography of polar regions, it is not a bibliography of polar bibliographies, but rather it is about polar bibliography, or as I have chosen to call it here in Brian Roberts' words, the organization of polar information (Roberts, 1960).

This paper will follow developments in this specialized area of documentation between 1945, the end of World War II, and 1978 when the first cold regions bibliographic database became available online. Following World War II, the strained relations between the U.S.S.R. and western countries (known as the Cold War) lead to increased government spending on research and development with potential use in military operations, much of which could be expected to involve the arctic border areas between the U.S.S.R. and other countries. In 1978, COLD, the online version of the Bibliography of Cold Regions Science and Technology, was introduced, followed by other cold regions databases.

At present, the potential exists to solidify a process already underway of organizing online polar bibliographic resources under a single umbrella.

Since the technology to achieve this goal is computer based, it seems timely to review the background prior to automation which led to present developments.

### Methods and Sources

The method used to prepare this review consisted of a rigorous inspection of the literature sources known to exist regarding the organization of polar information resources. Since this is a current topic, with many of the principals still living, much reliance has been placed on personal contact. At the same time, certain periodicals and conference proceedings known to carry articles on the topic have been systematically checked (Arctic Bulletin, Antarctic Journal of the United States, Polar Record, Special Libraries Association Geography and Map Division Bulletin, Northern Libraries Bulletin, Northern Libraries Colloquy Proceedings, etc.).

The topic of this paper has long been of interest to me. Over the years I have developed a personal collection of the pertinent literature through contacts at conferences and through visits made to all of the major (and many of the minor) polar library collections in North America and Europe.

It is ironic that even as we celebrate the computerized treatment of polar bibliographic resources, LISA (Library and Information Science Abstracts online) has recorded very few of the articles reviewed here. Perhaps what we, as polar information scientists and librarians, have contributed to, is the further proliferation of the already unwieldy "gray" literature!

### Introduction

The literature reviewed here is arranged and discussed more or less chronologically, allowing the reader to follow developments over a time period that began when World War II ended and the Cold War began demanding production of and access to information on cold regions. This period culminated in the computerized storage and online accessibility of cold regions bibliographical information in area-oriented databases.

The time period covered is divided into three sections. These divisions occurred naturally based initially on three individuals who were instrumental in identifying polar bibliographical resources and providing for the orderly storage and retrieval of these resources. Their work was followed by an unprecedented development of polar library collections and indexes, most of which involved a high degree of communication and cooperation between the agencies and individuals responsible. This communication and cooperation continues through several avenues at the present time.

The geographical area covered is generally referred to as the polar regions. These regions are variously defined; suffice it to say that this paper tends to be inclusive rather than exclusive in its interpretation of these regions.

All the material published is in the periodical literature, in conference proceedings, or in newsletters, etc. No book has been individually authored on this topic.

An attempt has been made to be comprehensive in covering this literature. Papers covering 1) the organization, storage, and retrieval of polar information; 2) cooperative efforts among polar information providers; and 3) the historical development of polar library collections, catalogues, and abstracting and indexing services have been especially sought.

The bibliography is divided to conform to the chronology of discussion, and follows the text for each section. Each bibliographic list is arranged alphabetically by author.

The entry form for the references follows that used for most scientific journals, including Arctic and Alpine Research. The author's last name and initials are followed by the date, the title, and the source of the article.

## 1. THE IDENTIFICATION, ORGANIZATION AND RETRIEVAL OF POLAR INFORMATION FROM THE END OF WORLD WAR II (1945) TO THE EARLY 1960s

This period is characterized by the efforts of three key individuals who provided direction in the identification of polar bibliographical resources, the organization of polar information, and the retrieval of polar information by means of a regularly published abstracting and indexing service.

### 1.1 Arthème A. Dutilly (b.1896 - d.1973) and the "Bibliography of polar bibliographies."

"The important scientific, economic and political role which the North Polar Regions have always played has increased enormously in the twentieth century, especially in World War II. The rapid expansion in the industrial exploitation of these regions with the accompanying scientific research has resulted in a tremendous number of publications ... " (Dutilly, 1945, p. 3).

The Rev. Arthème A. Dutilly, O.M.I., was a botanist who made 26 scientific trips between 1933 and 1960 to northern areas in Canada, Alaska, and Greenland. His published list of some 550 bibliographies on the polar regions (Dutilly, 1945) was stamped with the imprimatur of the Bishop of Ottawa. He followed this in 1949 with "A bibliography of reindeer, caribou, and muskox" (Dutilly, 1949) which, he said, "Will supplement the more general 'Arctic Bibliography' which is being compiled by the Arctic Institute of North America under sponsorship of the Office of Naval Research" (ibid. p. iii). His 1949 work was one "of a series of studies pertaining to the analysis of environmental factors affecting the issue, use and performance of Quartermaster supplies in arctic regions" (ibid.). The juxtaposition of the religious and the military has a long history in arctic operations.

### 1.2 Marie Tremaine (b.1902 - d.1984) and the Arctic Bibliography Project.

"The most recent bibliography of the Arctic as a whole is still Chavanne's Literatur über die Polar-Regionen, published in Vienna in 1878. It was to resolve the present bibliographical anarchy that the Arctic Institute of North America promoted its Bibliography Project as fundamental to any productive program of Arctic research" (Tremaine, 1948, p. 84).

The Arctic Bibliography Project, set up in 1947 as a short-term effort to "produce a comprehensive bibliography of Arctic research publications"

(ibid.), eventually resulted in 16 volumes containing over 108,000 references with abstracts (Arctic Institute of North America, 1953-1975). The Directing Committee for the Project was originally chaired by Dr. H.B. Collins, Jr., of the Smithsonian Institution, and included such well-known "arctic" names as Vilhjalmur Stefansson, Lincoln Washburn (credited in Volume 13 of Arctic Bibliography with having conceived the idea of Arctic Bibliography), and Sir Hubert Wilkins. The project was said to have profited by "the happy coincidence of a research institute concerned with the subject (Arctic Institute of North America) and of a government agency (the Department of Defence) willing and capable of supporting the staff necessary to compile the bibliography and providing the publication cost necessary to publish it" (Washburn, W.E., 1982, p. 327).

Much has been said in print about the Arctic Bibliography, beginning with its publication in 1953 (Anon., 1953).

Marie Tremaine moved into the editorial job from a position as associate head of the Reference Division of the Toronto Public Library, "where," as she said, "the North is a major fact of life" and she had "long been interested in the bibliographic organization of research materials" (Tremaine, 1954, p. 8). As she notes, this project was unique in "cutting across the two classic patterns, of national and subject, bibliography" (ibid., p. 8-9). Her account of the organization and implementation of this project is fascinating in its implicit assumption that this impossible task could be achieved (Tremaine, 1954). As Corley notes "The result of preparing Arctic Bibliography under conditions that would have made lesser beings throw up their hands in desperation was a work considered to be the best regional bibliography ever compiled" (Corley, 1985, p. 166). By 1962 Tremaine herself was willing to acknowledge that "the Arctic and Subarctic ... present by reason of their extent and diversity unusual problems in the organization and control of literature. An attempt to solve these problems is being made by the ... 'Arctic Bibliography'" (Tremaine, 1962, p. 247).

The articles by Parkin (1966) and Tremaine (1967) shed further light on the background to the Arctic Bibliography Project. In 1968 Polar Record published a note (A.C., 1968) summarizing very succinctly the scope of the Arctic Bibliography during its first twenty years, ending with the observation "It would be difficult to imagine polar research to-day without this scholarly resource" (A.C., 1968, p. 71). In 1970 E.M. Smith produced a thorough, if uncritical, telling of the Arctic Institute of North America and Arctic Bibliography stories to that date. Smith notes that the Arctic Bibliography is "a splendid example of international cooperation" (Smith, 1970, p. 14). The review by Andrews (1971) mentions the Arctic Bibliography's lack of currency and plans to convert to a computerized system to improve currency and accessibility.

### 1.3 Brian Roberts (b.1912 - d.1979) and "The organization of polar information."

"It must be frankly admitted that more polar information is now being collected and published than can be adequately digested through existing library and bibliographical machinery. Facts are not knowledge until mobilized into right contexts. It cannot be too strongly emphasized that a vast accumulation of unorganized facts is not knowledge. Field investigations

are now producing information faster and in greater volume than can be coordinated, generalized and assimilated, and the facts are getting unmanageable" (Roberts, 1960, p. 1).

Brian Roberts displayed numerous talents and achievements in polar exploration, biology, and policy making, and also possessed a keen insight into the necessity for access to polar information (Scott Polar Research Institute, 1979). His 1960 paper, The organization of polar information, was published with a view to closer cooperation between polar organizations. He believed in cooperative cataloging and a common classification system, published as the Universal Decimal Classification for use in polar libraries (Roberts 1963; 1976). Roberts deals with both poles and references such interesting predecessors as Paul Otlet (1906): L'organisation rationnelle de la documentation pour l'étude des régions polaires. Congrès International pour l'étude des régions polaires tenu à Bruxelles ... 1906 and J.L. Denucé (1913) Bibliographie Antarctique. Commission Polaire Internationale. Procès-Verbal de la Session tenue à Rome en 1913 ... (Roberts, 1963, p. 4).

The Universal Decimal Classification (UDC), although frequently used in polar libraries, has never quite become a standard in spite of many very good arguments in its support (Spletstoeser, 1975). Perhaps its most important quality is the level of specificity it allows in classification of documents. Although the library at the Scott Polar Research Institute continues to use UDC and to produce revisions and updates for its use in polar libraries, they stopped using it to classify references in Recent Polar and Glaciological Literature in 1985.

#### 1.4 Summary

The importance of the work of A. Dutilly, M. Tremaine, and B. Roberts lies in the groundwork that was laid upon which further work was built.

Dutilly brought together and described the existing bibliographies covering the polar regions.

Tremaine's work, which added yet another polar bibliography to this list, became a standard against which other bibliographical works on the polar regions were measured. Its importance to scholarly research cannot be overemphasized. It attempted, and to a large degree successfully, to encompass the literature of the entire arctic, regardless of subject, language, or document form.

Roberts had the vision to foresee the magnitude of the problems that would follow the "information explosion." The fact that his preference for the Universal Decimal Classification was not necessarily agreed upon by other polar librarians and bibliographers is not as important as the standards he set for whatever classification system would be used.

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## 2. DEVELOPMENT OF POLAR LIBRARY COLLECTIONS, CATALOGUES, AND INDEXES: (1960s - mid 1970s)

During this period, the major libraries and printed bibliographies dealing with the cold regions literature were developed. The existing libraries expanded, and many new ones were formed. Several of these are mentioned in this section; a comprehensive directory to such libraries exists (Minion and Cooke, 1985) and its use is encouraged. The major book catalogs and the larger periodically published indexing services are also described here. Since the Arctic Bibliography is discussed in sections 1 and 3 of this paper, it is not mentioned again in this section although volumes 9 through 16, over half of its total output, were published between 1960 and 1975.

### 2.1 "The Libraries and Literature of Cold and Cold Regions" (1963-1965) and the G.K. Hall library catalogs.

In June of 1963, The Geography and Map Division Bulletin of the Special Libraries Association began a series that eventually spanned two years and twenty-four parts (Geography and Map Division Bulletin, nos. 52-62, June 1963-Dec. 1965). This series was meant to "cover all the major institutions of the world ... which work with low temperatures or with regions of high altitude or high latitudes. Cold is the common factor in their work and their collections" (Geography and Map Division Bulletin, no. 52, p. 12). It was a very interesting concept, and although it did not cover all the institutions in existence, it described a good number of them. It is beyond the scope of this paper to be very detailed about this series, but several parts are worth noting. Most of the collections described have survived the years, albeit many were only fledgling outfits in the early 1960s. The hardest to recognize now are the various U.S. military facilities which held cold regions library collections. The foremost of these still in existence is the U.S. Army Corps

of Engineers Cold Regions Research and Engineering Laboratory (CRREL) Library, described by Salisbury (1963) in Part I.

The description of the Arctic Institute of North America (AINA) Library in Part X is interesting in regard to its outline of the classification scheme devised for this polar regions collection. The books were classified first by area, then by subject with an author number (Corley, 1964). A catalogue of the library's holdings was published (Arctic Institute of North America, 1968; 1971; 1974; 1980) and the library still exists, in somewhat altered form, at the Arctic Institute of North America at the University of Calgary (Maes, 1982).

The Stefansson Collection, still housed at Dartmouth College Library, and for which there has also been a catalogue published ([Dartmouth College Library], 1967), is described in fascinating detail in Part IX by the former librarian (and wife) of the famous arctic explorer, Vilhjalmur Stefansson (Nef, 1964). The story of the still unpublished (but available on microfilm from University Microfilms International) "Encyclopedia Arctica" makes interesting reading.

Part XXII, a very scholarly article, is by the librarian (until 1983) of the Scott Polar Research Institute (SPRI) (King, 1965). This collection has major holdings on Antarctica as well as northern Europe, the USSR and northern North America. Still in existence, its catalogue has also been published (Scott Polar Research Institute, 1976, 1981). What distinguishes King's paper is that mention is again made, (as earlier by Roberts and Tremaine) of the necessity of cooperation in the field of polar documentation "as yet very unbalanced" (King, 1965, p. 11). King mentions that already SPRI was: 1) exchanging catalog cards on a selective basis (with CRREL, the U.S. Office of Antarctic Programs, etc.); 2) publishing its library accessions as Recent Polar Literature; 3) publishing an abstract of the Universal Decimal Classification; and 4) attempting to reach international standardization on several problems. This early cooperative attitude had much bearing on future accomplishments in the field of polar bibliography.

The G.K. Hall Co. in Boston was the publisher of the library catalogs mentioned above for the Arctic Institute of North America, the Stefansson Collection, and the Scott Polar Research Institute. Complementing their coverage of cold regions were several more "book" catalogs: Bibliography of the Quebec-Labrador Peninsula (Cooke and Caron, 1968), the Catalogs of the Glaciology Collection, Department of Exploration and Field Research, American Geographical Society, New York (American Geographical Society, 1971), and the Research Catalogue of the American Geographical Society, Volume 15, Regional Numbers 47-52, Polar Regions, Oceans, Tropics (American Geographical Society, 1962).

## 2.2 "The Bibliography on Cold Regions Science and Technology" and "The Antarctic Bibliography."

The Bibliography on Cold Regions Science and Technology was first published in 1951; the present title is the fourth one used (Thuronyi, 1951-). This project is an ongoing publication of the Cold Regions Bibliography Project in the Science and Technology Division of the Library of Congress. It is sponsored by and prepared for the Cold Regions Research and Engineering

Laboratory (CRREL) of the U.S. Army Corps of Engineers. Subject coverage is oriented toward the mission of CRREL and deals with the physics and mechanics of snow, ice and frozen ground, and all aspects of cold regions engineering (Thuronyi, 1951-, 1972b, 1975). To date, over 130,000 records have been entered into this bibliography.

In 1962 a clearinghouse for Antarctic information was established at the National Science Foundation. (This office evolved into the present Division of Polar Programs.) From 1963 onward the Antarctic Bibliography has been published continuously (U.S. Library of Congress, 1963-); a retrospective volume covers the years 1951-1961 (U.S. Library of Congress, 1970). Several informative papers have been published by its editor, G.T. Thuronyi, in the Antarctic Journal of the United States, dealing with many facets of the organization of polar information south pole style (Thuronyi, 1972a, 1975, 1979).

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### 3. COOPERATIVE EFFORTS TOWARD BIBLIOGRAPHICAL CONTROL OF THE POLAR LITERATURE: 1971 - 1978

Whereas the two periods discussed above in this paper were concerned with the identification, collection, and organization of polar information, this section outlines developments leading to an unusual level of communication and cooperation among individuals and agencies responsible for the accessibility of polar information to an increasingly wide audience.

Communication among providers of polar information and polar bibliography has been furthered through the regular meetings of the Northern Libraries Colloquy and through other meetings concerned with provision of polar information. This communication has resulted in cooperation aimed at sharing polar information and polar bibliographic information.

#### 3.1 Conferences

##### 3.1.1 The Northern Libraries Colloquy - 1971 - 1976

In 1971 a Colloquy on Northern Library Resources was held in Edmonton, hosted by the Boreal Institute of Northern Studies. It was cosponsored by the Arctic Institute of North America, and was the idea of its librarian, Nora Corley, and also of Garth Graham, Director of Library Services, Government of the Yukon Territory (Cooke, 1974). Thus began an enduring and still flourishing dialogue among individuals dealing with or having an interest in the collection and dissemination of information on the North, including representation from libraries in northern areas and from libraries in the "south" supporting northern research and development. Cooperation and communication among "members" (there is no formal membership) of this truly international group have been carefully fostered through biennial meetings, The Northern Libraries Bulletin (1971-), and A directory of polar and cold regions library resources (Corley, 1975; Minion and Cooke, 1985).

The first six colloquies provided ample opportunity for the attendees to become acquainted with each other and with library collections of two types - in the north and about the north. In fact, research libraries dealing with cold regions anywhere on the globe have traditionally been represented. These meetings were held in Edmonton, Alberta; Hanover, NH; Cambridge, UK; Montreal, PQ; Rovaniemi, Finland; and Fairbanks, AK.

Proceedings have been published for all but the Sixth Colloquy (available on tape from the University of Alaska, Fairbanks). Topics of discussion ranged from organization of cold regions materials within libraries to discussion of cooperative efforts of several types. A look at the references from and about these colloquies will bear this out (Anderson, 1975, 1976, Cooke, 1975, 1977; Coutinho, 1975a-d; Guthridge, 1975; King, 1972,

1973c-d, 1974, 1975a-b; Korhonen and Wayland, 1975; Lloyd, R., 1975; Looker, 1975; Martna, 1975; [Northern Libraries Colloquy] 1976; Scott Polar Research Institute, 1973; Searby, 1975; Splettstoesser, 1975; Thuronyi, 1975b).

The need for an international polar bibliography is an ongoing topic of discussion at the colloquies. After a discussion of the Arctic Bibliography's apparent discontinuation at the Fifth Northern Libraries Colloquy (Korhonen and Wayland, 1975), a letter of support from the Colloquy was sent to the appropriate official at the National Science Foundation, the major funding agency for the bibliography at that time. In his reply he promised to keep the Colloquy informed of deliberations (Korhonen and Wayland, 1975, p.164-166). A user survey (de la Barre, 1976) discussed at the same Colloquy showed very wide support for the continuance of the Arctic Bibliography.

"After the Arctic Bibliography, what?" was the title of a session held at the Sixth Northern Libraries Colloquy in Fairbanks in 1976 (Anderson, 1976). At that Colloquy a committee was established "on an international bibliography for polar literature" (Graham, 1977, p. 8). A report authored by Graham (1973) was suggested as a "useful catalogue of possible directions" for the Colloquy to take in dealing with northern bibliographic problems (Graham, 1977, p. 8). A progress report for the "Committee on Northern Bibliography" was made on that committee's efforts in late 1977 (Anderson, 1977). By this time, the National Science Foundation had received the results of a study (Orr, 1977; Franklin Institute ..., 1977; Andrews, 1982) to determine if user needs could be met by the commercial online databases. The databases given consideration here were not area based, but were subject-oriented databases then growing in several discipline areas. Results of the study showed that 30% of arctic-related literature is not contained in a commercial service; for this and other reasons it was concluded that the Arctic Bibliography could not be replaced effectively by the commercial services (Orr, 1977). These results were anticipated by Thuronyi (1975a) in a study of antarctic bibliographical resources. He found that except in geology and geophysics the commercial services were inadequate, particularly in the areas of expedition literature and gray literature.

In spite of all the support it received, the Arctic Bibliography ceased some 20 years of publication in 1975, the victim of premature computer printing technology (Lloyd, R., 1975; Martna, 1974, 1975) and rising costs in the face of declining funding success. It remains a monument to itself, an authoritative reference source and one of the finest examples of regional bibliography ever compiled. Adams (1981) called it a "magnificent series" (ibid., p. 274), in a very complimentary recapitulation.

### 3.1.2 Other conferences

"At the suggestion of the Arctic Institute of North America a meeting of directors of polar institutes was convened at the Arktisk Institut, Kobenhavn, on 15 February 1972 to discuss means whereby Arctic institutes might collaborate more effectively in the collection, storage, and dissemination of information" (King, 1973a). Discussions centered around the compilation of a polar bibliography and shared cataloging (King 1973a, 1973b).

At The Fifth Canadian Universities Northern Science (Training) Conference, held at Schefferville, PQ, April 25-27, 1974, an important topic

At The Fifth Canadian Universities Northern Science (Training) Conference, held at Schefferville, PQ, April 25-27, 1974, an important topic was a Seminar on the Collection, Transmission and Exchange of Information on the North (Adams and Barr, 1975). The report on this seminar provides a kind of state of the art coverage of libraries, bibliographies, journals, other publications, and miscellaneous concerns relating to northern information. This report set the trend for later coverage of these topics by the Association of Canadian Universities for Northern Studies (ACUNS).

The 28th Alaska Science Conference, held in Anchorage, September 22-24, 1977, had as its theme "Science Information Exchange in Alaska." The conference chairman was David M. Hickok, who had already (1977) made suggestions for cooperation among agencies in Alaska providing and using environmental information. An ad hoc session of the Northern Libraries Colloquy Bibliography Committee was held. The International Northern Information Network (Graham, 1973) concept was discussed and endorsed by the Alaska Chapter of the American Association for the Advancement of Science (AAAS) which resulted in a resolution declaring that AAAS, Alaska Division "recognizes the need for an international northern information network and supports the efforts of the Northern Libraries Colloquy to create an "International Northern Information Network" (AAAS - Alaska Division, 1977). This resolution was partly in response to the decision to discontinue the Arctic Bibliography and any other support to an arctic bibliographic information system by the National Science Foundation which was made public at this meeting (Guthridge, 1977). Ironically, this news arrived in the same session as a paper by Falk (1977) stressing the need for cooperation (regional and international) to strengthen the bibliographic base for northern information resources.

### 3.2 Polar Bibliographies and Indexes

By the late 1970s both the Antarctic Bibliography and the Bibliography on Cold Regions Science and Technology were standard resources for agencies engaged in research and development in cold or polar regions. Augmenting these bibliographic sources were several smaller periodically published indexes such as Recent Polar Literature from the Scott Polar Research Institute, Glaciological Literature from the International Glaciological Society, Boreal Northern Titles and Yukon Bibliography from the Boreal Institute for Northern Studies, and Glaciological Notes from the World Data Center A for Glaciology. Several libraries also circulated their accessions lists.

Computerized production of some of these printed indexes was underway, both at the Library of Congress (Bibliography on Cold Regions Science and Technology) and at the Boreal Institute for Northern Studies (Boreal Northern Titles).

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#### 4. CONCLUSIONS

In 1978 the Bibliography on Cold Regions Science and Technology came online as a database called COLD (Dumont, 1982). A paper was given at the same meeting at which COLD was announced (the 7th Northern Libraries Colloquy) by W.E. Washburn (1982). In this paper he notes that "Bibliographic services are experiencing a transformation ... [C]omputer based information retrieval systems ... have increasingly replaced the dated bibliographies of the more traditional type" (ibid., p. 328). He asks "Will computer-stored machine retrievable databases replace conventional book-form bibliographies?" His own answer is "I believe they will to some extent but the two forms can co-exist (ibid., p. 329)."

Washburn titled his paper "Reflections on the bibliographic revolution in arctic studies." I prefer to call what has happened in the time period

covered by this paper an evolution rather than a revolution. Polar bibliographic services have developed gradually to include online databases along with library collections and printed indexes. What type of balance is achieved among these services remains to be seen.

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# The Old Company in a New Age: 20th Century Records in the Hudson's Bay Company Archives

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## Abstract

The paper delivered at the Northern Libraries Colloquy on 9 June 1988 was a slide talk illustrating the northern activities of the Hudson's Bay Company in the twentieth century. This paper is in three parts: a greatly compressed version of the slide talk, a brief account of the use of the Hudson's Bay Company Archives by environmental scientists and an introduction to the archival record of the Company's 20th century activities in the north.

## Part I

For the first two centuries of its existence, the Hudson's Bay Company, which was established by royal charter on 2 May 1670, concentrated its energies on the fur trade in western and northern Canada. After 1870, its focus shifted to land sales and then, in this century, to department stores, but until 1987 the Company remained a major force in the fur trade and in the life of northern Canada. Since 1987 the Company has concentrated almost exclusively on its department stores and real estate.

In the years before the First World War the Company began to move into the far north in pursuit of white fox (Arctic fox). New strategies in administration, personnel, transport and communication were developed in order to conduct the fur trade more effectively. Of particular interest were the Company's achievements in Arctic horticulture and the transits of the North-West Passage in 1928 to 1930 and in 1937. The 1920s were an especially adventurous decade. The Development Department of the London office researched and developed new ways of handling, processing and marketing fur trade products.

The Department also fostered the health and well-being of the Eskimos, and an interest in the problems of northern nutrition remained a feature of the Company until 1987. Some other notable activities of the decade were the Hudson's Bay Reindeer Company, which was an ultimately unsuccessful attempt to raise reindeer on Baffin Island, the Hudson's Bay North Russian Trading Company and the Kamchatka Venture. The Company's promotion of Arctic tourism and its use of its northern activities in its public relations are also worth

noting.

The Company first considered setting up an Archives Department in its London office in response to its 250th Anniversary in 1920. In 1970, when the Company became a Canadian company and transferred its head office from London to Winnipeg, the fate of the archives became the topic of hot debate. Under the terms of an agreement between the Company and the Province of Manitoba, signed in 1973, the archives were placed on deposit in the Provincial Archives of Manitoba. The Hudson's Bay Company Archives form a division of the Provincial Archives and its staff are provincial civil servants. The staff comprise the Keeper, Shirley Anne Smith, four archivists and two clerical/administrative staff. Since the transfer of the records the Hudson's Bay Company Archives have been increasingly used by academics and 'ordinary' Canadians alike. And when a resident of Povungnetuk can phone the archives to find out what resources we have for the history of his community, the decision to bring the archives to Canada is justified a thousandfold.

## Part II

As the Hudson's Bay Company was one of those big organizations, like the Canadian Government and the Churches of Rome and England, which had so much impact on the people of the north, it is natural to think of its archives only as a source for the human history of the north. By the nature of its business, however, the Company also had a considerable impact on Canadian wildlife and its records of furs, hides and other natural products harvested and sold form excellent 'time series'. These seem to have been first exploited by Gordon Hewitt in his posthumously published The Conservation of the Wild Life of Canada (1921). It was, however, to be the ecologist Charles Elton who really established the value of the Company's records for scientific studies through his work on population cycles in species such as the Arctic fox. He paid a graceful tribute to the Company by dedicating his Voles, Mice and Lemmings: Problems in Population Dynamics (Oxford, 1942) to Charles Sales, Governor of the Hudson's Bay Company from 1925 to 1931. (Elton, by the way, first contacted the Company in 1924 and most recently sent a research inquiry in 1986!) Other ecologists and zoologists have followed in Elton's tracks. Studies have recently been conducted in the archives on trumpeter swans and walrus, for example.

As the men who kept the journals of daily events at the Company's posts ('post journals') were obliged to record thermometer readings and otherwise comment on the weather, climatologists are also able to conduct 'armchair field work' in the archives. At some posts special 'meteorological journals' were kept as well. Tim Ball of the University of Winnipeg produced his University of London doctoral thesis, Climatic Change in Central Canada: A Preliminary Analysis of Weather Information from the Hudson's Bay Company Forts at York Factory and Churchill Factory, 1714-1850 (1983), on the basis of data extracted from the archives. Ball has recently turned his attention to the effect on the local Churchill climate of deforestation resulting from the Company's wood-cutting. (See his "Timber!", The Beaver, April/May 1987, pp.45-56.)

Alan J. W. Catchpole of the University of Manitoba has revealed the value of the Company ships' logs, with their accounts of sea ice, as another source for historical climatology. (See, for example, his article, co-written

with Marcia Faurer, "Ships' logs, sea ice and the cold summer of 1816 in Hudson Bay and its Approaches," Arctic, 38(2), June 1985, pp.158-165.)

### Part III

In 1931 the Board of the Hudson's Bay Company ruled that records in its Archives Department created later than 1870 would not be accessible to researchers. This restriction remained in force until 1970 when all records created up to 1900 were made available. It is only in the past few years that a thirty-year rule has been established (i.e., if the most recent letter in a file is dated 24 May 1962 the file will become available on 1 January 1993). As a result the Company's extensive documentation of its modern operations is not as well known or as much used as the records of its first two centuries, and this is why this introduction to the archival record concentrates on the twentieth century. There is a restriction of only fifteen years on the minutes of the Board, the Canadian Committee and subsidiary companies. Personnel dossiers are restricted until fifty years after the employee concerned left the Company's service; staff, however, will extract certain basic categories of information from such dossiers. There is, of course, no restriction on Company publications, including annual reports. Unless otherwise indicated, copyright in all material in the HBCA belongs to the Hudson's Bay Company.

Like Gaul, corporate records in the HBCA concerning the Company's modern activities in the north, are divided into three parts: London records, Winnipeg records and Departmental records. The really thorough researcher should be prepared to investigate all three of these divisions of the corporate records and should not assume that London and Winnipeg records will have little to do with life as she was lived in the north. This is far from being the case, as both London and Winnipeg took a keen interest in knowing the details of operations in the field.

The efficient handling of its current records was a major concern of the Company in this century. On the whole, this has proved advantageous to researchers. Minute books, for example, are meticulously indexed. Yet the pursuit of the elusive goal of the perfect filing system in which correspondence dealing with nearly every operation of the Company could find its place has meant that today's researcher must move doggedly from correspondence series to correspondence series. On the assumption that the value of records such as minutes, reports and accounts is sufficiently obvious, this introduction will deal mainly with these various correspondence series. Daunting as they may appear, these series should be viewed as mother lodes which the serious researcher should not neglect. Please note that many of these series do not deal in their entirety with northern activities.

London Records. Most of these records are in Section A. Two early correspondence series are A.10/192-527 (1911-1922, 5.7 metres), which are arranged alphabetically by name of correspondent and then in chronological blocks, and A.12/FT (Fur Trade) (c.1890-1919, 4.7 metres), which contains alphabetically arranged subject files. These series were replaced by A.92 (1919-1932, 64 metres) in which major correspondents were assigned a number and the correspondence was then filed numerically and chronologically. Other correspondence was filed alphabetically and chronologically. There are 265 major correspondents. The original card index fortunately survives and

various guides have been prepared by archives staff. A series of confidential files, A.93 (1915-1930, 90 centimetres) is a valuable adjunct to A.92.

A.92 was replaced by a subject filing system. These files are known collectively as the Dead Dossiers and have been cited under that name. They in fact form three series: A.102, Secretary's Dossiers (83 metres), A.103, Accountant's Dossiers (16 metres) and A.104, Governor's Dossiers (10 metres). This dossier system remained in use until 1970 and records created prior to 1932 may be found in it. During the 1920s, A.92 may have had a parallel dossier system, as was the case with the records of the Development Department. The Company's own alphabetical index to Series A.102 - A.104 survives.

The records of the Development Department (1925-1931) are in Series A.94-A.97. A.94 (3.15 metres) is a correspondence series on a system identical to that used in A.92. The loss of the original card index is made less serious by the fact that the series contains only 72 numbered correspondents. A.95 (2 meters) is a series of alphabetically arranged subject files which makes an excellent introduction to the activities of the Department. The records of the Fish and Fish Products Department (1931-1940), the Development Department's successor, are in Series A.98. This series includes two files on the Governor's 1934 Arctic voyage, owing to the fact that the Department's manager was also in charge of editorial publicity, a combination of duties that may strike one as entirely fitting.

The Company's shipping records are notably labyrinthine, especially to researchers pursuing the history of an individual vessel, as Ann Shirley and Helen Nixon have done for their forthcoming books on the Discovery and Nascopie, respectively. Until the early 1930s several fur trade vessels had their home ports in Britain and even after that period some ships were refitted or built in Britain. Records concerning northern Canadian shipping must therefore be sought in all three divisions of the corporate record. A special section of the London records called Section C contains numerous shipping records. For the 1920s the records of the Vessels Department (A.105-A.108) should also be consulted. As some fur trade ships also participated in the Company's First World War shipping activities, the French Government Records (AFG), the records of the Bay Steamship Company (RG4) and Sale & Co. may also have to be investigated. The miscellaneous section, Section Z, contains some records received from the Registry of Shipping and Seamen. The correspondence series described above should also be consulted.

Records of the Company's fur sales have been little used and have been the almost exclusive preserve of ecologists from Charles Elton to the present day. Given the role of the fur market in the northern economy perhaps some day other kinds of researchers will examine the records of the Company's fur sales. In this century the Company marketed furs in London, Canada and the U.S.A. and therefore all three divisions of the corporate record should be consulted. The records of C. M. Lampson & Co. (RG13), once a dominant force in the fur seal business, are worth noting. The Company's fur trading ventures in North Russia and Siberia are best documented in correspondence series mentioned elsewhere. There is a tiny but interesting collection of Hudson's Bay North Russian Fur Trading Company records in RG15, however. Several records, mostly reports and accounts, concerning the Kamchatka Venture are not yet fully arranged and described but look promising.

Winnipeg Records. Records of the Company's North American administration from the days of George Simpson to the 1920s may be found in Section D. The finding aid for this section should be consulted for the beginnings of series, mainly accounting and staff records, which were continued by the Canadian Committee Office and the Fur Trade Department.

The records of the Canadian Committee Office (RG2) contain 5 major correspondence series - Series 2, 3, 4, 7 & 8. (Series 5 and 6 deal with land sales and department stores). Series 2 is the confidential correspondence of Sir Augustus Nanton, the first Chairman of the Canadian Committee (1912-1924, 2.2 metres). This correspondence was organized by subject, with a simple numeric code. The original alphabetical index, which includes cross references, survives. Series 3, Non-Departmental Correspondence (1897-1926, 2 metres) includes files on mining and the Reindeer Company. Series 4, Fur Trade Department Correspondence (1919-1926, 1.7 metres) contains files not only on the fur trade in Canada but also on the Kamchatka Venture. These simple subject files were replaced c.1926 by an elaborate alpha-numerical system called the Roneo, now Series 7 (1904-1970, 11.7 metres). Many files originally classified in Series 3-6 were re-classified in the Roneo system. In addition to the Series 7 file list there is a file guide prepared by the archives to help researchers orient themselves. In the mid-1960s the Roneo system began to be replaced by the Direct Decimal system, a subject filing system based on much the same principles as the Dewey Decimal system. Again, files from earlier systems were often re-classified in what is now Series 8 (1911-1970, 27 metres). Twenty-five metres of Direct Decimal files will be placed with the records of the Head Office in Canada (RG9). In addition to the Series 8 file list there is a file guide prepared by the archives. Other RG2 series worth pointing out are the Base Files, dealing with policy (Series 10), P.A. Chester's Private Files (Series 11), three series of Personnel Files (Series 36-38), records of subsidiary companies, including the Reindeer Company (Series 56) and four series of records created by The Beaver and the Hudson's Bay House Library (Series 71-74). A series of insurance claims (Series 17) should not be overlooked, as it is a useful source for the cargoes of fur trade vessels and also for the hazards of life in the fur trade, e.g., the unfortunate post manager who ruptured himself while lifting a dead walrus.

Departmental Records. The records of the Fur Trade Department are in RG3 and of its successor, the Northern Stores Department, in RG7. It is important to note that 3 major series containing a significant amount of material over thirty years old have been placed in RG7. These are: Correspondence, filed according to the Roneo system (1934-c.1980, 17 metres), R. H. Chesshire's Private and Confidential Files (1954-1962, 25 centimetres) and Records of Buildings and Land (1920-1974, 2.2 metres). RG7 also contains 25 metres of personnel dossiers of employees who left the Department's employment 1959-1970.

Approximately one-third of the total extent of RG3 is taken up by 18 metres of personnel dossiers of employees who left the Department's employment 1936-1959. (RG3 Series 41A.) These are arranged by fiscal year and then alphabetically. The archives has prepared a nominal index. Once they are fully accessible these dossiers should prove an invaluable source for the study of life and business in the modern north.

RG3 is also rich in shipping records, especially log books (various series). Apart from Annual and Weekly Reports (RG3 Series 1, 2 & 3, Series A.74), the records of the District Offices are not as strongly represented as one might wish, but more records concerning Ungava and the Eastern Arctic have survived than for any other area, probably because of the efforts of Ralph Parsons and J. W. Anderson in preserving their District Office records. Two series of J. W. Anderson's Ungava records, Annual Reports from Posts, 1939-1941 (Series 26B) and Monthly Summaries of Events, 1942-1946 (Series 74B) have already proved their worth to ethnologists and community historians. The Ungava District included the Eastern Arctic. Most of the records created at the posts have been placed in Section B. This contains the post journals or journals of daily events which are the most heavily used records in the HBCA. After 1941 post journals were no longer kept, as it was considered that modern advances in communication had made them unnecessary. They were replaced by minute books on which the Monthly Summaries of Events were based. Some Ungava District minute books survive and are in Section B. The section also contains Birth, Marriage and Death Records of Natives, as the vital statistics kept by the post managers were called, for some Eastern Arctic posts. Section B also contains a disappointingly small number of post accounting records and the few extant radio logs.

In addition to the corporate record, the HBCA holds a variety of collections, consisting either of non-Company records or of Company records in other than textual media. Private textual collections, such as that of Ralph Parsons and J. W. Anderson, are in Section E. The Sound & Film Collection contains oral history tapes and the film of Governor Cooper's 1934 Arctic voyage. The Map Collection contains ships' plans, plans of buildings and lands, and some sketch maps by modern Fur Trade employees. The Kathleen Shackleton pastel portraits of men and women of the north are in the Picture Collection. The Photograph Collection is a particularly fine one, comprising photographs included as documentation in Company reports and correspondence, photographs by professionals commissioned by the Company and amateur photographs by Company employees. The collection was recently supplemented by the addition of the Head Office Photo Collection which contains over 100,000 photographs and negatives, including several first-rate collections of amateur and professional photographs of northern Canada.

The HBCA maintains a research library intended to supplement the archival record. It includes books acquired by the London and Winnipeg offices for their own reference purposes and also Company publications, notably, The Beaver, 1920- , and the Moccasin Telegraph, 1941- , the staff magazine of the fur trade. There is an author, title and subject index for The Beaver, to 1982. The Library includes a Rare Book Collection which has a fine selection of 18th and 19th century Arctic literature. The 'Fur Trade Library' contains the libraries maintained by the Company during the last century at posts such as York Factory and Fort Chipewyan - northern libraries indeed.

Apart from the usual battery of catalogues, finding aids and card indexes, the HBCA provides a variety of research tools. There is an extensive set of Search Files. Initially created in London and continually being updated and added to, these files often contain surprising quantities of information. Fact sheets in the form of Biographies, Post Histories and Ships' Histories are a Winnipeg innovation. They are both a handy source of

quick information and also point the way to records the more diligent researcher may wish to consult. All three are on disk for easy revision.

Finally, the Microfilm Project should be mentioned. All Company records up to 1870 were microfilmed as part of the plan of the Public Archives of Canada (as it then was) to copy records concerning Canada's past held in other countries. In addition to the set of microfilm held in the HBCA, there is a set at the Public Record Office at Kew and another at the National Archives in Ottawa. Under the terms of the export agreement between the British Government and the Company, all Company records up to 1904 must also be microfilmed. The year 1904 was chosen as being 70 years before the transfer of the archives to Canada. (In fact, some records later than 1904 have been microfilmed). The microfilming of the records from 1870 to 1904 is continuing and copies are deposited in Kew and Ottawa as they are produced. Some modern series, such as A.92, are being microfilmed for preservation.

The HBCA is also in the process of having a set of microfilm made for use in inter-library loan. This project should be completed by the end of September 1988 and researchers should eventually be able to borrow copies of modern series such as A.12/FT and A.92. A substantial number of microfilm reels is already available for inter-library loan.

While mail and telephone inquiries are welcomed, the staff can undertake to answer only a limited number of specific questions. Anyone wishing to conduct extensive research in the Company's 20th century records either will have to come to Winnipeg (whose reputation as the coldest large city in the world should be a positive attraction to a gathering such as this) or hire a researcher. Inquiries about hiring researchers should be directed to the Rupert's Land Research Centre, University of Winnipeg, 515 Portage Avenue, Winnipeg, Manitoba R2B 3E6 (Tel.: (204)786-9324). Inquiries about the archives should be directed to the HBCA at 200 Vaughan Street, Winnipeg, Manitoba R3C 1T5 (Tel.: (204)945-4949).

#### Further reading

For secondary sources on the Company's 20th century northern activities see The Beaver, a special tercentenary edition of the Moccasin Telegraph (1970) and the numerous autobiographies and biographies of the Company's 'Arctic men'. The recent relaxation of restrictions on the Company's modern records should soon result in an increase in the published literature on this period of its operations. For more detailed accounts of two topics mentioned in this paper see the author's "Charles Elton and the Hudson's Bay Company", The Beaver, Spring 1985, pp.22-29, and "We Are Still Adventurers': The Records of the Hudson's Bay Company's Development Department and Fish and Fish Products Department, 1925-1940", Archivaria, 21, Winter 1985/1986, pp. 158-165.

# Making a Database from the Accessions List of the Richardson-Voss Papers at the Scott Polar Research Institute Library Using dBase III

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## Abstract

This paper describes the setting up of a database to a smaller collection of manuscripts using a microcomputer database management system - dBase III.

The primary aim has been to create a database for free searches, search possibilities which the accession list lacks. There was also a wish to make an index of sender/recipient.

A secondary aim was to study the possibility to use an optical character reader as a means of data input.

## Background

The Richardson-Voss Collection has been placed on loan at the Scott Polar Research Institute. The collection mainly contains letters between Sir John Richardson and his family, and between him and fellow members of the scientific community. (Mr. Voss is a nephew of Miss Josephine Richardson and Miss Caroline Richardson, grandchildren of Sir John).

Sir John Richardson participated as a naturalist and surgeon in two major over-land expeditions to the Canadian Arctic Ocean to trace the coastline of the North American Continent. Both these expeditions took place in the 1820s and were led by Sir John Franklin. Richardson's duties were to collect minerals, plants and animals. After the expeditions utilizing his own findings and information supplied by other arctic explorers, he published a four volume *Fauna Boreali Americana* recognized as a pioneering work in Arctic biology.

At SPRI the Richardson-Voss collection has been sorted and thoroughly catalogued. While the accession list was being typed a lack of search possibilities became apparent and the need for an index of senders and recipients was identified. Work contributing to the solving of these two problems was suggested as the basis for a project which would be linked to a course on Archival information and modern media I had taken in Sweden. In discussion with the librarian at SPRI it was also suggested that the possibilities of using optical character recognition for the input of data should be explored.

RICHARDSON-VOSS LOAN

MS 1503/5/1-13     JOHN RICHARDSON PAPERS 1823-1824

- 1503/5/11     FRANKLIN, John. Letter to John Richardson. Delighted by receipt of JR's portrait. Murray asking for portraits of JR, Hepburn, Back and Franklin at his own expense. Preparations for next expedition. Franklin has seen Mr McIntosh. "Colonial Office seems inclined to give us everything".  
7 February 1824.
- 1503/5/12     PARRY,     Letter to John Richardson. Thanks for lists received. Congratulations on appointment to permanent department of English Navy.  
18 March 1824.
- 1503/5/13     BROWN,     Letter to John Richardson. Refers to drawings sent.  
30 July 1824.

MS 1503/6/1-14     JOHN RICHARDSON PAPERS 1825-1827

- 1503/6/1     RICHARDSON, John. Letter to Mary Richardson. Penetanguishine most advanced naval post in the Lakes. Two English ladies here. Last intercourse with Europeans, received notice of Mrs Franklin's death. Mrs R. is to take Mr Gray's advice. Penetanguishine, Lake Huron, 22 April 1825.
- 1503/6/2     RICHARDSON, John. Letter to Mary Richardson. Received at all trading stations with cordiality. Description of companions - Mr Back, Mr Kendall is an exact picture of Capt Franklin, Drummond the best disposed and most indefatigable naturalist.  
Fort William, Lake Superior, 12 May 1825.
- 1503/6/3     RICHARDSON, John. Letter to Mary Richardson. Satisfactory accounts of stores sent out previous year. Party travelling in detachments.  
Base de la Riviere, Winnipeg, 29 May 1825 (letter continued 6 June 1825).

Figure 1. Extract of the accession list.

## The creation of the database and its anatomy

There are numerous microcomputer database management systems on the market today. During my course I was introduced to dBase III which is a well-known system offering a high degree of flexibility. dBase III and its earlier versions have been used in many libraries for a variety of functions. The Paisley College Library used dBase II for the administration of a reserve book collection and the University Library in Cambridge used dBase III to create a support programme for cataloguing.

In dBase III the structure, or the framework, of a database file is established by defining each of the fields. The fields and field lengths are set by the accession list.

```
. disp stru
Structure for database: A:letters.dbf
Number of data records:      33
Date of last update   : 11/21/87
Field  Field Name  Type      Width  Dec
  1  ACCNR        Character  12
  2  WRITER       Character  25
  3  RECIPIENT    Character  25
  4  TYPE         Character   6
  5  SUBJECT      Character 250
  6  PLACE        Character  40
  7  DATE         Character  17
** Total **                376
```

Figure 2. Database structure.

## Using the database to compile an index

With dBase III it is possible to tailor the display format after your specific requirements. I made use of this inbuilt flexibility when designing the index to the accession list.

By using a command called "report" I was able to define which fields should be taken as parts of the display format. The fields I used for the creation of an index were "writer", "recipient", and "accession number".

writer	recipient	accnr
Richardson, John	Father	1503/1/1
Richardson, John	Father	1503/1/2
Richardson, John	Father	1503/1/3
Richardson, John	Father	1503/1/4
Richardson, John	Father	1503/1/5
Richardson, John	Father	1503/1/6
Richardson, John	Father	1503/1/7
Richardson, John	Father	1503/1/8
Richardson, John	Father	1503/1/9
Richardson, Gabriel	Richardson, John	1503/1/10
Barrow, John	Richardson, John	1503/2/1
Barrow, John	Richardson, John	1503/2/2
Richardson, John	Richardson, Mary	1503/2/3

Figure 3. Extract of index.

### Free searching

To search the database it is possible to use the dBase commands, but in order to simplify searching and make the database more user-friendly, it is advisable to provide a search menu.

```
. locate for type='poem'
Record =      28
. disp
Record# ACCNR      WRITER      RECIPIENT
SUBJECT

                PLACE                DATE
      28 1503/5/3  Richardson, Mary  Richardson, John
(?Valentine)

                                14 February 1823
```

Figure 4. Example of dBase command and record in dBase format.

This menu is created by writing a special programme within dBase III where you specify the menu format, fields to be searchable and the display format.

```
SUBJECT SEARCH
Give search term(s)

accnr:
1503/2/4
writer:
Richardson, John
recipient:
subject:
Icebergs off Greenland. Hudsons Straight. Ship "fell against the steep cliff".
ars of women and children going to Lord Selkirk's colony(?). Esquimaux.

place:
date:
```

Figure 5. Search menu and display of search.

### Optical character recognition as a means of data input

As we were attracted by the advantage of using optical character recognition for speeding up the process of data entry, we originally decided to test some of the optical character readers on the market. However this proved to be too time consuming and expensive to carry out and therefore I chose to concentrate on just one machine/scanner: the DEST Workless station 222/223.

I am extremely grateful to Swed-grama AB, the Swedish suppliers of DEST, for scanning some extracts from the accession list onto a disc. The scanner was reliable and it was not necessary to make many corrections. The output file was in ASCII codes and while proofreading it I added commas to separate each field. Subsequently it was possible to integrate this file into the database as new posts.

### Conclusion

It must be stressed in conclusion that only parts of the accession list have been computerized. However, the results of my project indicate that further computerization would be worthwhile, with or without the use of OCR.

A specific problem encountered during the project was the need to be consistent in the names given to individuals, places, events, etc. The fact that Sir John Richardson married three times and all his wives were called Mary does not make matters any easier.

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# **Putting Our Honorable Ancestors On-Line: A Northern Adventure**

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## **Abstract**

Every year librarians in Alaska, like librarians everywhere, are inundated with letters and personal visits from individuals who are trying to find their long lost ancestors. At times it seems that almost everyone has a relative who reportedly caught gold fever or felt the call of the wild and ventured to the north lands.

This paper discusses the indexes and data bases that are being produced in Alaska to provide genealogists, historians and other researchers with access to the information about the individuals who settled Alaska and adjacent Canadian communities.

## Arctic Information Available in the 'Umberto Nobile Documentation Centre'

Gertrude Nobile  
Centro Documentazione Umberto Nobile  
Vigna di Valle, Italy

The Umberto Nobile Documentation Centre is a specialized library, named for General Umberto Nobile, and is devoted primarily to Polar exploration and to aviation. The Centre is attached to the Italian Air Force History Museum, located at Vigna di Valle on Lake Bracciano, about 35 km north of Rome. It was inaugurated on 28 November 1980 and named after General Nobile in recognition of his having donated his collection of relics of his Polar expeditions with the airships NORGE (1926) and ITALIA (1928), as well as his personal library of books and documents relating to Polar exploration and aeronautical engineering. This material, of great scientific, technical and historical interest and value became the nucleus of the Centre.

Since its inception the library has been progressively enriched with many works, some donated, others purchased; it now has more than 4000 volumes and collections of periodicals on aviation and the Arctic, some of which date back to the beginning of the century. There are also historical archives mainly on Nobile's Polar expeditions, his participation in the Russian Polar expedition with the icebreaker MALYGHIN, his work of airship construction in the Soviet Union, etc. These archives contain some 3500 documents, drawings and blueprints of airships and other aircraft employed in Polar research; photographic archives; a section of geographical and navigational maps; and a large and rare collection of manuals of technical and aeronautical nomenclature of about 1000 volumes, concerning engines and aircraft built by such famous firms as Savoia-Marchetti, Macchi, Piaggio, Breda, Fiat, Caproni, etc.

The Centre's main functions are to collect, catalogue and make available to the public, particularly to scholars and students, publications and documents that will make it possible to effect a detailed historical and technical analysis of the events with which the mementos displayed in the Museum are connected, and to check and compare the technological progress linked to these events. A large stand in the Museum is dedicated to the Polar expeditions of General Nobile. In other words, its functions are those of a library specialized in aeronautics as applied to scientific purposes and exploration, especially to Polar exploration. Indeed, the library possesses some rare and precious books on Arctic subjects which have, as it were, their own individual story. An example is the 1876 edition of the explorer Julius

von Payer's account of the Austro-Hungarian Polar Expedition of 1872, which Pope Pius XI procured for General Nobile, through the office of the Papal Nuncio in Vienna, when Nobile was preparing the Polar expedition with the airship **NORGE**, the "Amundsen-Ellsworth-Nobile Transpolar Flight" in 1926. Another valuable relic is the book by J. D. Everett, Elementary Treatise on Natural Philosophy (based on A. Privat Deschanel's Traite de physique), 14th ed., London 1897, which belonged to the 1903 Ziegler-Fiala Polar expedition, and which was found by Nobile on Rudolph Island, Franz Joseph Land, during the voyage with the Russian icebreaker **MALYGHIN** in 1931. The collection includes books by explorers who tried to reach the North Pole by aerostat, airship or aeroplane, such as the famous diary by Salomon A. Andrée, Med Örnén mot Polen (1897), Stockholm, A. Bonniers, 1930; the works by Sir George Hubert Wilkins, and those by Frederick A. Cook, Mittelholzer, Santos-Dumont, etc. There are also various works on geographical research in the Arctic and Antarctic regions, which are still of scientific and strategic importance today. Mention must also be made of the many volumes on aeronautical engineering, the numerous publications that commemorate Air Force feats, and a series of biographies and autobiographies of prominent personalities in Polar exploration, aviation and in sciences, starting with Leonardo da Vinci.

The material in this Polar library is classified according to the Universal Decimal Classification, however, for classifying material concerning the Arctic sciences, use is also made of Brian Roberts' UDC for Use in Polar Libraries, 3rd ed., 1976, published by the Scott Polar Research Institute, Cambridge, England. Much of the collection of the Umberto Nobile Documentation Centre is catalogued in Class 6, Applied Sciences, of which Aeronautical Engineering represents a sub-class; and Class 9, History and Geography (including Polar exploration). Class 5, Natural Sciences, is also well represented with many important works on theoretical aerodynamics, meteorology in Polar regions, physics and mechanics.

The Centre's special collections, i.e., the archives of photographs, geographical and navigational maps, and the manuals of technical aeronautical nomenclature, are also catalogued and made accessible through card indexes and chronological and subject-matter lists. The archives contain documents that constitute unique mementos, for example: the original contract drawn up between the Italian Government and the Aeroclub of Norway for the sale of the airship **NORGE N-1** for the 1926 Rome/Alaska Transpolar Flight; the contract bears the signatures of Amundsen, Ellsworth, Nobile and the President of the Norwegian Aeroclub, Thommessen. There is also the contract between Nobile and the Goodyear Corporation of Akron, Ohio, where, from 1922 to 1923, he was a technical consultant on the construction of the military airship **R.S. 1**, after he had become famous as a designer of many semirigid airships of his type. Among them are the Nobile-built airship **T.34 ROMA** of 34,000 cubic metres, sold to the U.S. Army in 1921; other airships of various dimensions of his design were sold to Spain, Argentina, Gr.Britain and Japan.

The geographical maps section of the Umberto Nobile Documentation Centre contains, among other items, the navigational charts used by the airships **NORGE** and **ITALIA** to reach the North Pole in 1926 and 1928, respectively.

The criterion used in acquiring books and documents is that they be of technical and historical value on the subjects of Polar exploration and of aeronautical means used in Arctic surveying and exploration, in the past as well as in modern times.

In the short time that has elapsed since its foundation in 1980 the Centre has clearly acquired a collection of considerable importance, though relatively small in size. Therefore, visiting the Historical Air Force Museum at Vigna di Valle, one can not only follow aviation history from Leonardo da Vinci up to modern times, but also, in the Umberto Nobile Documentation Centre, penetrate the secrets of the Arctic through Polar exploration with dirigibles and other aerial means of transport.

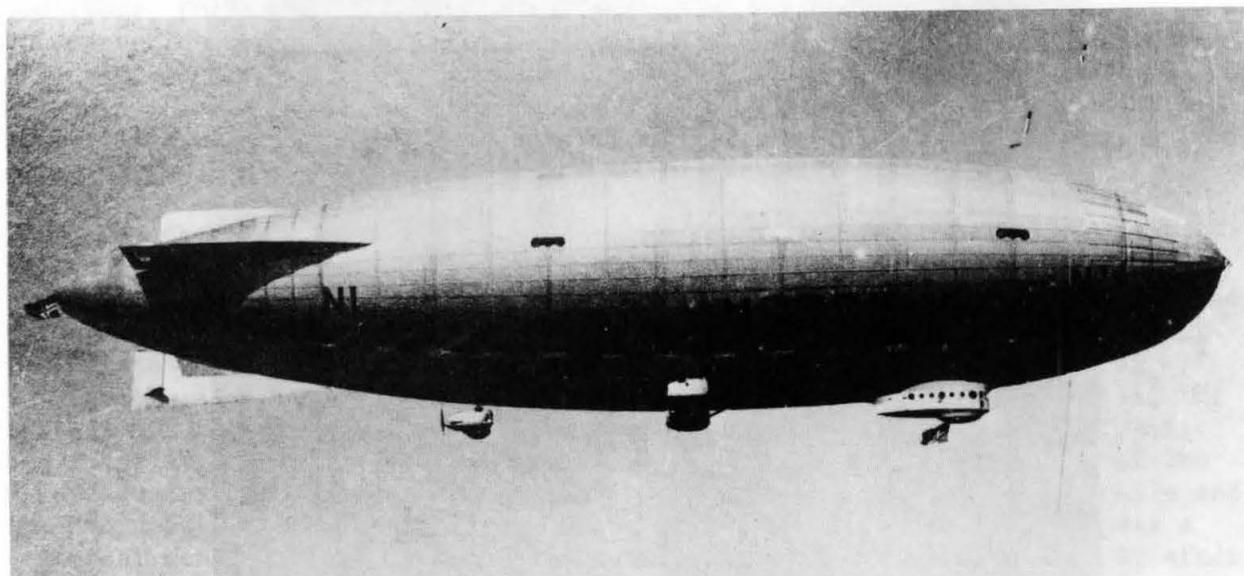


The Umberto Nobile Documentation Center. Left to right: Major O. Ferrante, Vice-Director of the Museum; General G. Pesce, Conservator; Col. A. Rampelli.

## The Importance of Aircraft in Polar Exploration

Umberto Nobile, the Italian aeronaut and Arctic explorer (1885-1978) was educated as an engineer; in 1915 he entered the Air Force Engineering Corps and rose to the rank of General. Later in his career he held various university chairs. As designer of many semirigid airships, Nobile became world famous as both designer and commander of the airships NORGE N-1 (1926) and ITALIA N-4 (1928) which were used in two of Polar history's most epic expeditions. The "Amundsen-Ellsworth-Nobile Transpolar Flight", 1926, from Rome to Alaska, is the first confirmed attainment of the North Pole and discovery of the Arctic Ocean between the Pole and Alaska, opening the Polar Route for the first time. The U.S. nuclear-powered submarine NAUTILUS in 1958 crossed the Arctic Ocean, submerged, from Alaska to Spitzbergen via the North Pole, following the same route as Nobile's NORGE but in the opposite direction. Afterwards, the submarine's Commander Capt. William A. Anderson, wrote to Nobile:

"Dear General . . .  
From your courageous flight over the Polar pack ice in 1926 it was established that there was no land between Alaska and Spitzbergen. Without this knowledge, found by you and confirmed by aerial expeditions that followed you, we would not have known enough to undertake this voyage . . ."



VOLO TRANSPOLARE ROMA-ALASKA

PASSAGGIO AL POLO NORD: 12 MAGGIO 1926  
ORE 1,30 - TEMPO DI GREENWICH

Over the North Pole  
12 May 1926

The airship NORGE, 1926.



In Alaska after the "Amundsen-Ellsworth-Nobile Transpolar Flight", 1926 with the NORGE-1. Seated from left: Roald Amundsen, Lincoln Ellsworth, Umberto Nobile; and the crew.

The Italian Polar Expedition of 1928 carried out with the airship *ITALIA* N-4 reached the North Pole again. This essentially scientific expedition was prepared and headed by General Umberto Nobile together with three scientists on board: Prof. F. Behounek of Prague University, Prof. Aldo Pontremoli of Milan University, and Dr. Finn Malmgren of Uppsala University. Important scientific research was carried out in oceanography, earth-magnetism, atmospheric electricity, etc., as well as the surveying of large, and until then, unexplored regions of the Arctic. The scientific results were published in 1929 by General Nobile in collaboration with the above mentioned scientists.

Sixty years have passed since the Polar expedition with the airship *ITALIA* and 62 years with the airship *NORGE*, yet they remain unequalled enterprises. These airships were the first and the only ones to reach the North Pole. Such historical facts and the name of their leader will remain in

Polar history as stated by the English writer and pilot, John Grierson, who wrote in his book Challenge to the Poles, London, 1964:

. . . "Nobile will go down in history as the greatest Arctic airship commander. Both NORGE and ITALIA were dwarfs compared with the GRAF ZEPPELIN, their speed and range also being much less. Yet the GRAF's subsequent ventures into the Arctic were limited to one flight to Iceland and one to Novaya Zemlya. Nobile believed in himself and in the ships made to his own designs, and he inspired loyalty in his crew whom he led with a fine spirit of enterprise. After the crash of the ITALIA their physical sufferings, mostly due to the failings of those who should have been the first to help, were many. All this, however, was a small matter compared to the mental anguish and humiliation heaped on Nobile by his fellow countrymen. By good fortune, the General has survived the period of calumny to see restitution and praise, properly though belatedly bestowed upon him".

The ITALIA Polar expedition, of which in this year falls the 60th anniversary, represents an important achievement in the scientific exploration of the Arctic. A considerable number of books and articles have been written about that expedition, which, as is known, ended tragically with the crash of the airship on the pack ice. A selection of pertinent literature is listed in the attached bibliography. Preference has been given to books and articles in English.

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