ED 406 980   IR 056 355

AUTHOR   Helal, Ahmed H., Ed.; Weiss, Joachim W., Ed.
TITLE   Towards a Worldwide Library: A Ten Year Forecast.
              Proceedings of the International Essen Symposium (19th,
              Essen, Germany, September 23-26, 1996). Publications of
              Essen University Library, No. 21.
INSTITUTION   Essen Univ. (Germany). Library.
REPORT NO   ISSN-0931-7503; ISBN-3-922602-22-3
PUB DATE   97
NOTE   354p.
PUB TYPE   Collected Works - Proceedings (021)
EDRS PRICE   MF01/PC15 Plus Postage.
DESCRIPTORS   Academic Libraries; Access to Information; *Electronic
              Libraries; Foreign Countries; *Futures (of Society); Higher
              Education; Information Dissemination; *Information
              Technology; Internet; Librarians; Library Administration;
              *Library Development; *Library Role; Library Services;
              Organizational Change; Research Libraries; Strategic
              Planning; *Technological Advancement; Total Quality
              Management; World Wide Web
IDENTIFIERS   Information Age

ABSTRACT
        The 25 papers presented at this symposium focus on the
future of libraries and library services in an ever evolving Information Age.
The papers deal with topics such as: economic and political issues in
determining the future of the professionally managed library; adding value to
library services; the need for librarians and library educators who are
masters of both book forms and electronic information retrieval; the revival
of the Ancient Library of Alexandria project; managing organizational change;
strategic planning and management of change; the local academic library
within the worldwide context; choice and voice in determination of research
librarian roles; a new kind of strategic planning in which flexibility and
adaptability to change are key elements; new services in academic libraries
through institutional alignment and leadership; challenges of digital
information for research libraries; how technology may help or hinder the
development of the digital library; SwetsNet(R) as an electronic agent for
libraries and publishers; evaluation in the digital library; multilingual
access to libraries' databases; a model for the electronic university
library; new tasks and developments in bibliographic utilities and library
networks; a comparison of online search engines and search strategies; the
Andrew W. Mellon Foundation's journal storage project; the LAIRD (Libraries
and Archives Integrated Resources Database) source for Scottish culture;
Internet search engines; using the World Wide Web to disseminate information
on the Internet; providing public access to information over the Internet;
document delivery towards the Year 2000; and a 10-year forecast of
developments in information science and technology. The symposium agenda, a
list of participants, and a list of participating vendors are provided.
Contains an index. (AEF)

Veröffentlichungen der
Universitätsbibliothek Essen **21**

Publications of
Essen University Library **21**

Towards a Worldwide Library :
A Ten Year Forecast

Edited by

Ahmed H. Helal
Joachim W. Weiss

Universitätsbibliothek Essen

Veröffentlichungen der Universitätsbibliothek Essen

Publications of Essen University Library

Edited by

Ahmed H. Helal
Joachim W. Weiss

Vol. 1
Current Trends in Serials Automation
Essen Symposium
6 Oct. - 8 Oct. 1980
3-922602-01-0

Vol. 2
Hierarchical Relationships in Bibliographic Descriptions
Library Systems Seminar Essen
25 March - 27 March 1981
3-922602-05-3 (out of print)

Vol. 3
Workshop zur Benutzerschulung
1 April - 3 April 1981
3-922602-03-7 (out of print)

Vol. 4
Future of Library Networks
Essen Symposium
16 Sept. - 18 Sept. 1981
3-922602-04-5 (out of print)

Vol. 5
Increasing Productivity through Library Automation
Essen Symposium
11 Oct. - 14 Oct. 1982
3-922602-06-1 (out of print)

3

Ode to Ahmed Helal

The Essen Librarian's Symposium has a status unique in the field.
A place in this august gathering is not one you'd willingly yield.
It began at the start of the eighties and has gone on for seventeen years,
It's not about eating and drinking but about sharing your hopes and your fears.
Delegates come from all over, from north, south, east and from west,
It attracts the high and the mighty, the cleverest and always the best.
The Symposium is Helal's legacy to the world of librarianship.
Long may it continue to flourish, giving vision and fellowship.
Ahmed, we will miss your warm welcome and your cheerful, smiling face.
For your rrrolling 'rrrs' and darrrk mischief, in our hearts there is always a place.

Happy rrretirement

Bernard Gallivan

Universitätsbibliothek Essen

Essen University Library

Towards a Worldwide Library : A Ten Year Forecast

19th International Essen Symposium

23 September - 26 September 1996

Edited by

Ahmed H. Helal

Joachim W. Weiss

Universitätsbibliothek Essen

Essen 1997

∞ This publication is printed on permanent paper conforming to
   ISO (DIN-ISO) 9706.

Table of Contents

19th International
Essen Symposium 1996

Essen University Library

**Towards a Worldwide Library :
A Ten Year Forecast**

23 September - 26 September 1996

Preface

The annual International Essen Symposium which was the 19th in its series was held in Essen University Library during the period from 23rd to 26th September, 1996 with full registration of about 110 invited participants, 24 speakers, and 16 vendors. Representatives and speakers, from 15 countries, in the field of library automation, information technology, consultants, and worldwide known colleagues in international library activities, shared in the international gathering.

The topic of the 19th International Essen Symposium was "Towards a Worldwide Library : A Ten Year Forecast". As in the last two decades the Essen Symposium attracted internationally distinguished colleagues who expressed their thoughts how the libraries and information centers should act and react for the decade which straddles the millennium: 1996 - 2006.

It goes without saying that the tremendous increase and rise in the use of Information Technology (IT) and electronic devices provide the driving force for the Symposium and its outcomes. The growing acceptance of the use of electronic media - by librarians, faculty, and decision makers - will have an immense impact on our services, management, staffing, etc. The impact will grow rapidly into the next century and libraries as well as information centers must plan effectively for change rather than passively responding.

Libraries and librarians are experiencing a period of radical change. The rapid development of information technology forces us to be prepared for the future. It is vital for us and in practical terms we have to be prepared for the future expecting all kinds of changes and planning for it.

We librarians can't reengineer our libraries or increase our services and productivity unless the innovations we implement can break down our organizational barriers in the direction of global structures and forgetting the traditionally local and institutional form. We are facing an era which requires an integration of information technology on a national and international base, being able to distribute and share information electronically across geographic and organizational borders, and to coordinate the operation of outsourced functions. **However, with the core operations to be performed in-house.**

As a result, the today's most promising and ambitious innovation is the urgent need for extended networks which should be able to distribute and share information among libraries and information centers working together electronically on an everyday basis.

The 1996 Symposium provided a thought provoking set of ideas and scenarios and how we have to work and react to enter the new millennium. The lectures cover a very wide span on and about the current state-of-the-art and forecasts on possible technological developments.

H. WHITE comes to the conclusion that "*The one thing that computers clearly cannot do is to aid swamped and deluged end users to decide what should be read and what can be safely ignored.*"

R. LESTER underlines the importance of need to add value to our services. "*In a world where any information in any form will in principle be able to be sent from anywhere to anywhere 'at the touch of a button' everyone realises that the anticipatory 'just-in-case' role that libraries and their librarians have traditionally performed comes under threat from 'just-in-time' solutions.*"

I. SEVER treating the topic from another aspect is wondering how "*bridging the gab may be the biggest challenge facing librarians and library educators during the next decade.*"

12

R. DOUGHERTY predicts that "*in libraries it is safe to say that the jobs of all employees will be affected in the days ahead.*"

S. CORRALL stresses on how important it is to prepare libraries for the 21st Century and how it must be a smooth procedure. "*We need a strategic management framework to transform our visionary dreams into concrete actions. This means thinking strategically, ... to develop services tailored to customer priorities. ... Structures need to be fit for their purpose and fluid to enable progress.*" Finally "*... effective library managers will be leaders with vision, people who are flexible and listen to the views of others, but who are also decisive and prepared to take responsibility of change.*" In other words: "*Communication is the key to success in the change process and must be managed actively.*"

M. BECKMAN approaches the subject from another point of view, namely "*the rapidly increasing availability of electronic resources and their supporting networks is changing the fundamental basis of reference work. The directions which academic research libraries are pursuing can be similarly identified, with the World Wide Web and new electronic publishing technologies among the most important.*"

A. ANGILETTA in his key lecture "*... particularly addresses the issue of choice and voice in determination of functions and roles of research librarians in a mixed electronic and print environment.*"

M. LINE outlines the outlook of the next decade in the following: "*The next decade at least will be one of chaos, during which old boundaries between libraries, computing, educational technology and teaching will be broken up. ... The traditional strategic plan setting out firm programmes for the next three or five years should give way to a more fluid kind of planning in which flexibility and adaptability to change are key elements.*"

F. OLIVER in his lecture about how technology may help or hinder the development of the digital library underlines that "*... a world-wide library will require the creation of global digital libraries ... available to all the people of the world.*" In achieving this goal "*key technologies will be required to develop the world-wide library.*" Moreover, F. LANCASTER stresses on the problems and methods relevant to implement the digital library environment.

G. CLAVEL-MERRIN touches on a very sensitive aspect, namely, the multilingual access to libraries' databases, i.e. to search for information in databases containing material in more than one language and how these elements could be considered and incorporated in an electronic global library.

R. DE GENNARO calls for "... *electronic replications of backfiles of core journals ... to preserve and increase access to the information contained in them.*" This is not a single task for a library but can only be achieved within collaborative projects.

It is an accepted fact today that the Internet is the world's most popular network for accessing, gaining, and delivering information on a global basis. However, the Internet is still a foundation and starting point rather than a final solution which still has to be tailored to produce meaningful impact. Today, the Internet is widely used just for interinstitutional communications.

A. TOROK and J. WEST explain in detail how Internet and intranets could replace trained professionals for online access to information and facilitate communications and unlock hidden resources.

With these issues in mind, it is understandable that many libraries and librarians seek in the Internet the opportunity to gain positive objectives without having to build up a networking infrastructure.

The forecasts of the 19th International Essen Symposium will have a wide echo and appeal to library directors and suppliers of IT helping and enabling them to:

- actively plan for the next decade;
- becoming aware of future opportunities and implementing in their advantage;
- becoming aware of computer and technology developments;
- consider the impact of electronic media on libraries, librarians and end users;
- plan for change and using IT effectively;
- plan managerial and strategically for the next decade;
- avoid isolated island solutions of local library automation and turn into networking environment. The today's IT possibilities have to be extended.

The Symposium looked at and exposed the importance of information technology and impact on digital libraries with a broad scope of recent developments and information services in the library world, i.e. new technologies and methods for the future libraries and future prospects. In conclusion, digital libraries will be the most important source of information in the next century.

This publication of Essen University Library is the record of the 19th International Essen Symposium on "Towards a Worldwide Library : A Ten Year Forecast" and covers important aspects for the 21st Century. Our responsibility as librarians is not only to satisfy our clients, but also to determine the best ways to optimize the networking configuration (hardware and software) so as to minimize the costs of operation. Continuous monitoring and measuring the effectiveness of the system used in terms of availability, reliability, performance, etc. are very important for operating policies (managing by measurements - total quality management (TQM)).

On behalf of the organizing committee of the International Essen Symposia we would like to express and extend our sincere thanks and gratitude to all speakers, participants, and vendors who made the International Essen Symposia a success. In the last two decades the Symposia were fully met not only by the proceedings' results but also by invited speakers, innovative ideas and the wide range of approaches and impact. The results were fruitful and encouraging.

The International Essen Symposia were a suitable opportunity for colleagues to discuss issues of worldwide interest and stimulating for the coming generations. Librarians are looking for the internationalization and globalization of information services in the 21st Century in which computer and information technology will make possible access to information available anytime and anywhere simultaneously "just-in-time". The final goal is "universal access to information services".

This volume, no. 21 of *Publications of Essen University Library,* may be the last in this series. As the previous volumes we hope that it will be an enrichment in your collection about the latest developments in library and information technology.

One of the unique exciting challenges of the next decade will be the revival of the ancient library of Alexandria - BIBLIOTHECA ALEXANDRINA. The completion of the building is foreseen for the end of 1998.

Now we are in a transitional phase to establish a mechanism and an organizing committee in Alexandria, Egypt to secure the continuation of the International Symposium in its smooth, friendly and warm atmosphere. The help of all of you is needed.

Looking forward meeting you in Egypt at the:

1st International Symposium
BIBLIOTHECA ALEXANDRINA
Realization of a Future United with the Past
Alexandria, Egypt 1997/98

Essen, January 1997

A. H. Helal
J. W. Weiss

16

19th International
Essen Symposium 1996

Essen University Library

Towards a Worldwide Library :
A Ten Year Forecast

23 September - 26 September
1996

Agenda

Monday, 23 September

10.00	Registration
11.00	Vendors presentation
14.00	Opening of Symposium **Ahmed Helmi Helal**

Chair:	**Ahmed Helmi Helal**
14.15	Economic and Political Issues in Determining the Future of the Professionally Managed Library over the Next Ten Years **Herbert S. White**
15.00	Discussion Coffee
15.45	The Need to Add Value **Ray Lester**
16.15	Educating Librarians for a Worldwide Library: Skills and Curricula **Irene Sever**
16.45	Discussion

19.00   Reception

             Evening Lecture:

             BIBLIOTHECA ALEXANDRINA:
Revival of the Ancient Library of Alexandria Project
Mohsen Zahran

Tuesday, 24 September

Chair: **Richard M. Dougherty**

9.30   Navigating Permanent "Whitewater" of Organizational Change
Richard M. Dougherty

10.00   Discussion
Coffee

10.45   Round table

             Creating Change without Chaos:
Preparing Libraries for the 21st Century
Sheila Corrall

             The Local Academic Library within the Worldwide Context: Changes, Directions, Realities
Margaret Beckman / John B. Black

             The Morphing of Research Librarians in the New World: Or, Myths and Realities of Professional Choice and Voice
Anthony M. Angiletta

             Chaos, Strategy and Planning: Can They be Reconciled?
Maurice B. Line

12.15   Discussion
Lunch break

Chair: **Elisabeth Niggemann**

14.30   Challenges of Digital Information for Research Libraries
Sul H. Lee

15.00	How Technology May Help or Hinder the Development of the Digital Library **Frank B. Oliver**
15.30	Discussion Coffee
16.15	Swets as an Electronic Agent for Libraries and Publishers: *SwetsNet®* - The Electronic Warehouse **Pieter Rustenburg**
16.45	Discussion
19.00	Reception

Wednesday, 25 September

Chair:	**Look Costers**
9.30	Evaluation in the Context of the Digital Library **Frederick W. Lancaster**
10.00	Discussion Coffee
10.45	Multilingual Access to Libraries' Databases **Genevieve Clavel-Merrin**
11.15	A Model for the Electronic University Library **Mel W. Collier**
11.45	Discussion Lunch break
Chair:	**Patricia Battin**
14.00	Agony and Ecstasy of the Internet: Experiences of an Information Scientist Qua Publisher **Eugene Garfield**
14.30	Discussion Coffee

15.15	JSTOR: The Andrew W. Mellon Foundation's Journal Storage Project **Richard De Gennaro**
15.45	LAIRD and the Curriculum plus a short note on The Future of National Libraries in Britain **Bernard Gallivan**
16.15	Discussion
18.30	Reception

Thursday, 26 September

Chair:	**Janet Mitchell**
9.30	Internet Search Engines: Are Users Ready? **Andrew G. Torok**
10.00	The Intranet: Using the World Wide Web to Disseminate Information over the Internet **James A. West**
10.30	Discussion Coffee
11.15	Providing Public Access to Information on the Internet **Paul Nieuwenhuysen / Patrick Vanouplines**
11.45	Document Delivery towards the Year 2000 **Sue Orchard**
12.15	Discussion
12.30	Conference Summary **Susan K. Martin**
12.45	Close of Symposium

20

Participants

19th International Essen Symposium 1996

Austria

Murray, Janice   EDV-GmbH
Hofmühlgasse 3-5
A-1060 Wien
Tel.: +43/1/599071283
Fax: +43/1/599071422
E-mail: janice-anne-murray@edvg.co.at

Reich, Christa   EDV-GmbH
Hofmühlgasse 3-5
A-1060 Wien
Tel.: +43/1/599071185
Fax: +43/1/599071422
E-mail: christa_reich@edvg.co.at

Reinitzer, Sigrid   Universitätsbibliothek der
Universität Graz
Universitätsplatz 3
A-8010 Graz
Tel.: +43/316/3803101
Fax: +43/316/384987
E-mail: reinitzer@bkfug.ac.at

Schweigl, Johann   EDV-GmbH
Hofmühlgasse 3-5
A-1060 Wien
Tel.: +43/1/599071257
Fax: +43/1/599071422
E-mail: schweigl@edvg.co.at

Stock, Karl F.

Universitätsbibliothek der
Technischen Universität Graz
Technikerstr. 4
A-8010 Graz
Tel.: +43/316/8736150
Fax: +43/316/823204

Belgium

Nieuwenhuysen, Paul

Vrije Universiteit Brussel
Pleinlaan 2
B-1050 Brussel
Tel.: +32/2/6292436
Fax: +32/2/6292693
E-mail: pnieuwen@vub.ac.be

Vanouplines, Patrick

Vrije Universiteit Brussel
Pleinlaan 2
B-1050 Brussel
Tel.: +32/2/6292436
Fax: +32/2/6292693
E-mail: pvouplin@vub.ac.be

Canada

Beckman, Arthur

Beckman Associates
Library Consultants Inc.
168 John Street West
Waterloo, Ontario N2L 1C5
Tel.: +1/519/7427064
Fax: +1/519/5792052

Beckman, Margaret

Beckman Associates
Library Consultants Inc.
168 John Street West
Waterloo, Ontario N2L 1C5
Tel.: +1/519/7427064
Fax: +1/519/5792052
E-mail: mbeckman@hookup.net

22

Pearson, Ellen M.   R.R.2
                         Ariss, Ontario N0B 1B0
                         Tel.: +1/519/8241208
                         Fax: +1/519/8241208
                         E-mail: epe@uoguelph.ca

Denmark

Barnholdt, Bent   Arnevange 49
                         DK-2840 Holte
                         Tel.: +45/45806381
                         Fax: +45/45806381
                         E-mail: bent.barnholdt@winet.dk

Hein, Morten   Hein Information Tools
                         Noddevang 5
                         DK-2770 Kastrup
                         Tel.: +45/32514346
                         Fax: +45/32511380
                         E-mail: heinit@inet.uni-c.dk

Ronbol, Kirsten   Aalborg University Library
                         Langagervej 4
                         Postbox 8200
                         DK-9220 Aalborg Ost
                         Tel.: +45/98158522
                         Fax: +45/98156859

Egypt

Zahran, Mohsen   Bibliotheca Alexandrina Project
                         GOAL
                         Shallalat Bldg., 116, El Horreya Av.
                         Bab Sharqi
                         Alexandria
                         Tel.: +2/03/4836024
                         Fax: +2/03/4836001

Zahran, Sayle   23 Roushdy St., App. 3
                         Roushdy
                         Alexandria
                         Tel.: +2/03/848717

Finland

Haarala, Arja-Riitta
Tampere University of Technology
Library
P.O.Box 537
Fin-33101 Tampere
Tel.: +358/31/3653148
Fax: +358/31/3652907
E-mail: haarala@adm.tut.fi

Germany

Adams, Bernhard
Klinikstr. 32
D-44791 Bochum
Tel.: +49/234/594611

Albers, Christoph
Deutsches Bibliotheksinstitut
Luisenstr. 57
D-10117 Berlin
Tel.: +49/30/23119464
Fax: +49/30/23119410
E-mail: hsz@dbi-berlin.b.shuttle.de

Andresen, Caren
Swets & Zeitlinger GmbH
Schaubstr. 16
D-60596 Frankfurt/Main
Tel.: +49/69/63398835
Fax: +49/69/6314216
E-mail: candresen@swets.nl

Barckow, Klaus
Universitätsbibliothek Paderborn
Postfach 1621
D-33046 Paderborn
Tel.: +49/5251/602048
Fax: +49/5251/603829
E-mail: bw@ub.uni-paderborn.de

Bein, Anne
Swets & Zeitlinger GmbH
Schaubstr. 16
D-60596 Frankfurt/Main
Tel.: +49/69/63398811
Fax: +49/69/6314216

Bilo, Albert

Universitätsbibliothek Essen
Universitätsstr. 9
D-45117 Essen
Tel.: +49/201/1833700
Fax: +49/201/1833231
E-mail: bilo@bibl.uni-essen.de

Bittner, Rosemarie

America House
USIS
Hardenbergstr. 22-24
D-10623 Berlin
Tel.: +49/30/31107401
Fax: +49/30/31107400
E-mail: bitbera@usia.gov

Bösing, Laurenz

Universitätsbibliothek Trier
D-54286 Trier
Tel.: +49/651/2012496
Fax: +49/651/2013977

Boone, Mary L.

America House
USIS
Hardenbergstr. 22-24
D-10623 Berlin
Tel.: +49/30/31107410
Fax: +49/30/31107433
E-mail: mboone@usa.gov

Bossmeyer, Christine

Die Deutsche Bibliothek
Adichesallee 1
D-60325 Frankfurt / Main
Tel.: +49/69/7566712
Fax: +49/69/7566709
E-mail: bossmeyer@dbf.ddb.de

Brenner, Reinhard

Stadtbibliothek Essen
Hollestr. 3
D-45127 Essen
Tel.: +49/201/8842000
Fax: +49/201/8842003

Elek, David	OCLC Europe Hammer Dorf Str. 79 D-40221 Düsseldorf Tel.: +49/211/9179647 Fax: +49/211/9179647 E-mail: david_elek@t-online.de
Franke, Siegfried	Universitätsbibliothek Ulm Schloßbau 38 D-89079 Ulm Tel.: +49/731/5025800 Fax: +49/731/5025803 E-mail: siegfried.franke@bibliothek.uni-ulm.de
Gallus, Bertram	Carl Heymanns Verlag KG Luxemburger Str. 449 D-50939 Köln Tel.: +49/221/943730 Fax: +49/221/94373901 E-mail: gallus@heymanns.com
Gattermann, Günter	Sächsische Landesbibliothek Staats- und Universitätsbibliothek Dresden Dülferstr. 1 D-01069 Dresden Tel.: +49/351/4634308 Fax: +49/351/4637173
Geh, Hans-Peter	Württembergische Landesbibliothek Konrad Adenauer Str. 8 D-70047 Stuttgart Tel.: +49/711/2124424 Fax: +49/711/2124422 E-mail: geh@www.wlb-stuttgart.de
Habermann, Heinz	Deutsches Bibliotheksinstitut Alt-Moabit 101A D-10559 Berlin Tel.: +49/30/39077131 Fax: +49/30/39077100 E-mail: habermann@dbi-berlin.de

Hampel, Erich   Schulz Bibliothekstechnik GmbH
Friedrich-Ebert-Str. 2a
D-67346 Speyer/Rhein
Tel.: +49/6232/31810
Fax: +49/6232/40171

Hans, Manfred   DYNIX GmbH / MDIS GmbH
Hahnstr. 70
D-60528 Frankfurt/Main
Tel.: +49/69/6664160
Fax: +49/69/6664703

Hastedt, Pedro G.   Universitätsbibliothek Essen
Universitätsstr. 9
D-45117 Essen
Tel.: +49/201/1833701
Fax: +49/201/1833231
E-mail: peha@bibl.uni-essen.de

Heiligenstein, Eric   DYNIX GmbH / MDIS GmbH
Große Elbstr. 143a
D-22767 Hamburg
Tel.: +49/40/3068480
Fax: +49/40/381351

Helal, Ahmed H.   Schinkelstr. 37
D-44801 Bochum
Tel.: +49/234/702431
Fax: +49/234/702431

661 El-Horreya Avn. I/61
Genaklis - Alexandria
Egypt
Tel.: +2/03/5721563
Fax: +2/03/5721563

Höwekamp, Klaus   Carl Heymanns Verlag KG
Luxemburger Str. 449
D-50939 Köln
Tel.: +49/221/94373305
Fax: +49/221/94373310

Hoffmann, Heinz-Werner	Hochschulbibliothekszentrum NRW Postfach 410480 D-50864 Köln Tel.: +49/221/4007570 Fax: +49/221/4007580 E-mail: hwhoff@hbz-nrw.de
Kirchberg-Jeske, Maria-Theresia	Universitätsbibliothek Essen Universitätsstr. 9 D-45117 Essen Tel.: +49/201/1833709 Fax: +49/201/1833711 E-mail: kirchberg-jeske@bibl.uni-essen.de
Klaus, Hans-Gerhard	Projektträger Fachinformation GMD-PTF Dolivostr. 15 D-64293 Darmstadt Tel.: +49/6151/869725 Fax: +49/6151/869740 E-mail: klaus@darmstadt.gmd.de
Koch, Dagmar	LIB-IT GmbH Rosenweg 5/2 D-74385 Pleidelsheim Tel.: +49/7144/821246 Fax: +49/7144/821248 E-mail: libit.koch@t-online.de
Kreuzhagen, Wolf-Ulrich	DYNIX GmbH / MDIS GmbH Große Elbstr. 143a D-22767 Hamburg Tel.: +49/40/3068480 Fax: +49/40/381351
Krosch, Karin	Lange & Springer Otto-Suhr-Allee 26/28 D-10585 Berlin Tel.: +49/30/340050 Fax: +49/30/3420611 E-mail: l+s-berlin@geod.geonet.de

Kuhlmann, Hans Joachim	Auf'm Keller 53 D-45149 Essen Tel.: +49/201/710554

Lehmann, Klaus-Dieter
Die Deutsche Bibliothek
Zeppelinallee 4-8
D-60325 Frankfurt/Main
Tel.: +49/69/7566484
Fax: +49/69/7566476
E-mail: lehmann@dbf.ddb.de

Lix, Bruno W.
Hochschulrechenzentrum der
Universität GH Essen
Schützenbahn 70
D-45117 Essen
Tel.: +49/201/1832888
Fax: +49/201/1833960
E-mail: lix@hrz.uni-essen.de

Lux, Ursel
Boehringer Ingelheim KG
Zentralbibliothek
Georg-Fischer-Str. 4
D-65474 Bischofsheim
Tel.: +49/6132/773559
Fax: +49/6132/774721
E-mail: lux@bikde04.bikde.bi-d.dbp.de

Merz, Reinhard
Springer Verlag GmbH & Co.KG
Tiergartenstr. 17
D-69121 Heidelberg
Tel.: +49/6221/487665
Fax: +49/6221/487288
E-mail: merz@springer.de

Munz, Susanne
DYNIX GmbH / MDIS GmbH
Burgenlandstr. 44c
D-70469 Stuttgart
Tel.: +49/711/1357890
Fax: +49/711/8179348

Niggemann, Elisabeth — Universitäts- und Landesbibliothek Düsseldorf
Universitätsstr. 1
D-40225 Düsseldorf
Tel.: +49/211/8112030
Fax: +49/211/8113054
E-mail: niggeman@uni-duesseldorf.de

Odening, Karin — Lange & Springer
Otto-Suhr-Allee 26/28
D-10585 Berlin
Tel.: +49/30/340050
Fax: +49/30/3420611
E-mail: l+s-berlin@geod.geonet.de

Osswald, Achim — Fachhochschule Köln
Claudiusstr. 1
D-50678 Köln
Tel.: +49/221/82753388
Fax: +49/221/3318583
E-mail: achim.osswald@uni-koeln.de

Patane, Sam — LIB-IT GmbH
Rosenweg 5/2
D-74385 Pleidelsheim
Tel.: +49/7144/821246
Fax: +49/7144/821248

Pflug, Günther — Myliusstr. 27 II
D-60323 Frankfurt/Main
Tel.: +49/69/724874

Pohl, Doris — Universitätsbibliothek Essen
Universitätsstr. 9
D-45117 Essen
Tel.: +49/201/1833698
Fax: +49/201/1833231
E-mail: ub@bibl.uni-essen.de

Reinhardt, Werner	Universitätsbibliothek Wuppertal Postfach 10 01 27 D-42001 Wuppertal Tel.: +49/202/4392686 Fax: +49/202/4392695 E-mail: reinhardt@bib.uni-wuppertal.de
Rutz, Reinhard	Deutsche Forschungsgemeinschaft Kennedyallee 40 D-53175 Bonn Tel.: +49/228/8852418 Fax: +49/228/8852272
Saur, Klaus Gerhard	Saur Verlag GmbH & Co. KG Ortlerstr. 8 D-81373 München Tel.: +49/89/76902460 Fax: +49/89/76902450
Schindler de Andrade, Stefanie	EBSCO Orleansstr. 4 D-81669 München Tel.: +49/89/4587160 Fax: +49/89/45871649
Schmidt, Ronald M.	Hochschulbibliothekszentrum NRW Classen-Kappelmann-Str. 24 D-50931 Köln Tel.: +49/221/4007532 Fax: +49/221/4007580 E-mail: schmidt@hbz-nrw.de
Schwalbe, Ingeborg	Freie Universität Berlin John F. Kennedy-Institut für Nordamerikastudien Bibliothek Lansstr. 5-9 D-14195 Berlin Tel.: +49/30/8382858 Fax: +49/30/8382860

Steinwachs, Katarina   The British Council
Hahnenstr. 6
D-50667 Köln
Tel.: +49/221/2064435
Fax: +49/221/2064468
E-mail: bc-koeln@edina.xnc.com

Thiele, Rolf   Universitäts- und Stadtbibliothek Köln
Universitätsstr. 33
D-50931 Köln
E-mail: thiele@ub.uni-koeln.de
Tel.: +49/221/4702379
Fax: +49/221/4705166

Weiss, Joachim W.   Universitätsbibliothek Essen
Universitätsstr. 9
D-45117 Essen
Tel.: +49/201/1833690
Fax: +49/201/1833231
E-mail: weiss@bibl.uni-essen.de

Zimmer, Arno   Dr. Karl Thomae GmbH
Birkendorfer Str. 65
D-88400 Biberach a. d. Riss
Tel.: +49/7351/547273
Fax: +49/7351/542173

Israel

Sever, Irene   University of Haifa
Library Studies
Mount Carmel
Haifa 31905
Tel.: +972/4/8249034
Fax: +972/4/8257753

Sever, Shmuel   University of Haifa
Mount Carmel
Haifa 31905
Tel.: +972/4/8240289
Fax: +972/4/8257753
E-mail: sever@lib.haifa.ac.il

The Netherlands

Costers, Look	Pica
	Schipholweg 99
	NL-2316 XA Leiden
	Tel.: +31/71/5246500
	Fax: +31/71/5223119
	E-mail: look.costers@pica.nl
Courtens, Harry-Jan	University Library Nijmegen
	P.O.Box 9100
	NL-6500 HA Nijmegen
	Tel.: +31/24/3612402
	Fax: +31/24/3615944
	E-mail: mj.courtens@ubn.kun.nl
Janssen, Harry	University Library Nijmegen
	P.O.Box 9100
	NL-6500 HA Nijmegen
	Tel.: +31/24/3615982
	Fax: +31/24/3615944
	E-mail: h.janssen.ubn.kun.nl
Rustenburg, Pieter	Swets & Zeitlinger BV
	Postbus 197
	NL-1000 AD Amsterdam
	Tel.: +31/20/5659300
	Fax: +31/20/6911735
	E-mail: prustenburg@swets.nl
Severens, M. N.	University Library Nijmegen
	P.O.Box 9100
	NL-6500 HA Nijmegen
	Tel.: +31/24/3612465
	Fax: +31/24/3615944
	E-mail: severens@ubn.kun.nl
Smit, Anja	University Library Nijmegen
	P.O.Box 9100
	NL-6500 HA Nijmegen
	Tel.: +31/24/3612400
	Fax: +31/24/3615944
	E-mail: a.smit@ubn.kun.nl

Snijders, Paul — Elsevier Science
P.O.Box 211
NL-1000 AE Amsterdam
Tel.: +31/20/4853778
Fax: +31/20/4853808
E-mail: p.snijders@elsevier.nl

Verbaas, Jaap E. — University Library Nijmegen
P.O.Box 9100
NL-6500 HA Nijmegen
Tel.: +31/24/3612465
Fax: +31/24/3615944
E-mail: j.verbass@ubn.kun.nl

Norway

Hunstad, Siv — Norsk Systemutvikling A/S
Malmogt 7
N-0566 Oslo
Tel.: +47/22371800
Fax: +47/22370775
E-mail: siv.hunstad@mikromarc.no

Lomheim, Ingar — Norwegian University of Science
and Technology
Hoegskoleringen 1
N-7034 Trondheim
Tel.: +47/73595110
Fax: +47/73595103
E-mail: ingar.lomheim@ntub.unit.no

Sweden

Hallgren, Svante — Bibliotekstjaenst AB
P.O.Box 200
S-22100 Lund
Tel.: +46/46/180248
Fax: +46/46/180464
E-mail: hallgren_svante@mail.btj.se

Olson, Nasrine	Swedish School of Library and Information Science Siriusgatan 61 S-19555 Märsta Tel.: +46/8/59128765 Fax: +46/8/59128775 E-mail: nasrine.olson@hb.se

Switzerland

Black, John B.	International Red Cross Telecommunications 17 Chemien dis crets CH-1211 Geneva Tel.: +41/22/7344310 Fax: +41/22/7330395
Clavel, Pierre	Clavel SA Av. des Cerisiers 12 CH-1009 Pully Tel.: +41/21/7295512 Fax: +41/21/7296377 E-mail: staff@clavelsa.ch
Clavel-Merrin, Genevieve	Clavel SA Av. des Cerisiers 12 CH-1009 Pully Tel.: +41/21/7295512 Fax: +41/21/7296377 E-mail: staff@clavelsa.ch
Dopatka, Ulrich	Stadt- und Universitätsbibliothek Bern Münstergasse 61 CH-3000 Bern 7 Tel.: +41/31/3203286 Fax: +41/31/3203299 E-mail: dopatka@stub.unibe.ch

Gavin, Pierre

REBUS
Rue Mauborget 8
CH-1003 Lausanne
Tel.: +41/21/3116580
Fax: +41/21/3116582
E-mail: gavin@stub.unibe.ch

United Kingdom

Arnold, Kathryn

De Montfort University
Hammerwood Gate
Kents Hill
UK-Milton Keynes MK7 6HP
Tel.: +44/1908/834923
Fax: +44/1908/834929
E-mail: karnold@dmu.ac.uk

Collier, Mel W.

De Montfort University
The Gateway
P.O.Box 143
UK-Leicester LE1 9BH
Tel.: +44/116/2577039
Fax: +44/116/2577170
E-mail: mwc@dmu.ac.uk

Corrall, Sheila

University of Reading
Library
Whiteknights, PO Box 223
UK-Reading RG6 6AE
Tel.: +44/1734/318772
Fax: +44/1734/316636
E-mail: s.m.corrall@reading.ac.uk

Gallivan, Bernard

National Library of Scotland
Georg IV Bridge
UK-Edinburgh EH1 1EW
Tel.: +44/131/2264531
Fax: +44/131/2206662
E-mail: b.gallivan@nls.uk

Hunt, Elizabeth	UMI The Old Hospital Ardingly Road, Cuckfield UK-West Sussex RH17 5LG Tel.: +44/1444/445000 Fax: +44/1444/445050 E-mail: ehunt@ipiumi.demon.uk
Lester, Ray	Natural History Museum Library and Information Services Cromwell Road UK-London SW7 5BD Tel.: +44/171/9388971 Fax: +44/171/9389290 E-mail: r.lester@nhm.ac.uk
Line, Maurice B.	10 Blackthorn Lane Burn Bridge UK-Harrogate HG3 1NZ Tel.: +44/1423/872984 Fax: +44/1423/879849 E-mail: mbl@hgte.demon.co.uk
Mitchell, Janet	OCLC Europe 7th Floor Tricorn House 51-53 Hagley Road, Edgbaston UK-Birmingham B16 8TP Tel.: +44/121/4564656 Fax: +44/121/4564680 E-mail: janet_mitchell@oclc.org
Oliver, Frank B.	Frank Oliver Associates Ltd. 60, Charlesford Avenue Kingswood UK-Maidstone, Kent ME17 3PH Tel.: +44/1622/843502 Fax: +44/1622/843502

Oliver, Glynis

Frank Oliver Associates Ltd.
60, Charlesford Avenue
Kingswood
UK-Maidstone, Kent ME17 3PH
Tel.: +44/1622/843502
Fax: +44/1622/843502

Orchard, Sue

UMI
The Old Hospital
Ardingly Road, Cuckfield
UK-West Sussex RH17 8LG
Tel.: +44/1444/445000
Fax: +44/1444/445050
E-mail: umi@ipiumi.demon.co.uk

Williams, Robert

ISI Europe
Brunel Science Park
UK-Uxbridge UB8 3PQ
Tel.: +44/1895/270016
Fax: +44/1895/256710
E-mail: rwilliam@isinet.com

USA

Anderson, Greg

Massachusetts Institute of Technology
IT Information Systems
Building E19-324
77 Massachusetts Avenue
Cambridge, MA 02139-4307
Tel.: +1/617/2535654
Fax: +1/617/2586875
E-mail: ganderso@mit.edu

Angiletta, Anthony M.

Stanford University Libraries &
Academic Information Resources
6004 Green
Stanford, CA 94305-6004
Tel.: +1/415/7251011
Fax: +1/415/7254902
E-mail: tangilet@sulmail.stanford.edu

Battin, Patricia 2801 New Mexico Avenue N.W.
Apt. 202
Washington, D.C. 20007
Tel.: +1/202/3384804
Fax: +1/202/9656320
E-mail: pbattin@aol.com

De Gennaro, Richard JSTOR
188 Madison Ave
New York, NY 10016
Tel.: +1/212/5927345

Dougherty, Ann Dougherty and Associates
321 S. Main St., Suite 300
Ann Arbor, MI 48107
Tel.: +1/313/6623925
Fax: +1/313/6624450
E-mail: 72263.1222@compuserve.com

Dougherty, Richard M. University of Michigan
School of Information and Library Studies
550 East University
Ann Arbor, MI 48109-1092
Tel.: +1/313/7649376
Fax: +1/313/7642475
E-mail: rmdoughe@umich.edu

Garfield, Eugene *The Scientist*
3600 Market Street
Philadelphia, PA 19104
Tel.: +1/215/3860100
Fax: +1/215/3871266
E-mail: garfield@aurora.cis.upenn:edu

Lancaster, Frederick W. Graduate School of Library
and Information Science
University of Illinois
at Urbana-Champaign
501 East Daniel Street
Champaign, IL 61820-6212
Tel.: +1/217/3333280
Fax: +1/217/2443302

Lee, Sul H.	University of Oklahoma
	401 West Brooks, Rm. 212NW
	Norman, OK 73019-0528
	Tel.: +1/405/3252611
	Fax: +1/405/3257550
	E-mail: shlee@uoknor.edu
Martin, Susan K.	Georgetown University
	Lauinger Library
	3700 O St., NW
	Washington, D.C. 20057-1006
	Tel.: +1/202/6877425
	Fax: +1/202/6877501
	E-mail: skmartin@guvax.georgetown.edu
Torok, Andrew G.	Northern Illinois University
	LEPS Department
	DeKalb, IL 60115-2896
	Tel.: +1/815/7533406
	Fax: +1/815/7539371
	E-mail: atorok@niu.edu
West, James A.	True North Communications Inc.
	Information Center
	101 East Erie Street
	Chicago, IL 60611-2897
	Tel.: +1/312/4406957
	Fax: +1/312/4407279
	E-mail: jwest@truenorth.com
White, Herbert S.	330 E. El Viento
White, Virginia	Green Valley, AZ 85614
	Tel.: +1/520/6259359

Participating Vendors

19th International Essen Symposium 1996

Carl Heymanns Verlag KG

Luxemburger Str. 449
50939 Köln
Germany
Tel.: +49/221/943730
Fax: +49/221/94373901

DYNIX GmbH / MDIS GmbH

Große Elbstr. 143a
22767 Hamburg
Germany
Tel.: +49/40/3068480
Fax: +49/40/381311

EBSCO Subscription Services

Orleansstr. 4
81669 München
Germany
Tel.: +49/89/45871623
Fax: +49/89/45871649

Elektronische Datenverarbeitung Gesellschaft mbH - EDV GmbH

Hofmühlgasse 3-5
1060 Wien
Austria
Tel.: +43/222/599070
Fax: +43/222/59907199

ELSEVIER Science B.V.
Molenwerf 1
1014 AG Amsterdam
The Netherlands
Tel.: +31/20/4853911
Fax: +31/20/4843533

EX LIBRIS S.A.
119, avenue Gaston Diderich
1011 Luxembourg
Luxembourg
Tel.: +352/446556
Fax: +352/453676

Institute for Scientific Information / Europe
Brunel Science Park
Uxbridge UB8 3PQ
United Kingdom
Tel.: +44/1895/270016
Fax: +44/1895/256710

Kluwer Academic Publishers Group
Spuiboulevard 50
3300 AZ Dordrecht
The Netherlands
Tel.: +31/78/392104
Fax: +31/78/392254

Lange & Springer
Wissenschaftliche Buchhandlung
Otto-Suhr-Allee 26/28
10585 Berlin
Germany
Tel.: +49/30/340050
Fax: +49/30/3420611

LIB-IT GmbH

Bibliotheks EDV-Systeme
Rosenweg 5/2
74385 Pleidelsheim
Germany
Tel.: +49/7144/821246
Fax: +49/7144/821248

OCLC Europe

7th Floor, Tricorn House
51-53 Hagley Road, Edgbaston
Birmingham B16 8TP
United Kingdom
Tel.: +44/121/4564656
Fax: +44/121/4564680

R + R Messtechnik und Handel GmbH

Sandgasse 41
8010 Graz
Austria
Tel.: +43/316/464828
Fax: +43/316/46482820

Schulz Bibliothekstechnik GmbH

Friedrich-Ebert-Str. 2a
67346 Speyer
Germany
Tel.: +49/6232/31810
Fax: +49/6232/40171

Springer Verlag GmbH & Co. KG

Tiergartenstr. 17
69121 Heidelberg
Germany
Tel.: +49/6221/345188
Fax: +49/6221/300186

Swets & Zeitlinger GmbH
Schaubstr. 16
60596 Frankfurt/Main
Germany
Tel.: +49/69/6339880
Fax: +49/69/6314216

UMI
The Old Hospital
Ardingly Road, Cuckfield
UK-West Sussex RH17 8LG
Tel.: +44/1444/445000
Fax: +44/1444/445050

44

Economic and Political Issues in Determining the Future of the Professionally Managed Library over the Next Ten Years

Herbert S. White
Green Valley, Arizona, USA

Herbert S. White has a B.S. in Chemistry from the College of the City of New York and an M.S. in Library Science from Syracuse University. In the last forty years he took up many posts in the Library of Congress, Atomic Energy Commission, Chance Vought Aircraft, IBM, NASA, and Institute for Scientific Information. From 1975 till 1995 he was a Professor, Dean and Director of the Research Center, School of Library and Information Science, Indiana University, Bloomington, Indiana. Since 1995 he is Distinguished Professor Emeritus, Indiana University and Adjunct Professor, University of Arizona. He is the author of more than 150 books and articles; consultant; frequent speaker and presenter of seminars and workshops; and serves on editorial boards and as a reviewer.

Abstract

Library management strategy has been based on two premises. First, we argued that we were really teachers or professors, with the job of enabling individuals to learn to use information for their own life-long benefit, both personal and professional. Second, we postulated that our unique task was the identification, acquisition, and organization of information so that others would be able to use it. In one sense, the two strategies meshed.

As a mechanism for achieving professional recognition, status, and pay, the first has been doomed to failure from its very inception, simply because our 'fellow' teachers and professors have never acknowledged or accepted us as equals or as partners. The second strategy now runs headlong into two sweeping generalizations - the first that organizations need to downsize by eliminating those positions that do not contribute directly and immediately to organizational objectives. The second generalization, which feeds the first, is that identifying, acquiring, and organizing material so that others can use it is something that computers can do very well, with minimal instruction and control.

The one thing that computers clearly cannot do is to aid swamped and deluged end users to decide what should be read and what can be safely ignored.

Management writers such as Tom Peters and Peter Drucker understand this problem. Drucker postulated almost ten years ago that the profession with the brightest future was that of knowledge workers, individuals who would channel individuals to the information they needed, and protect them from what they should not bother to read. If we can assume that knowledge workers have a bright future, do we want to be knowledge workers?

I have set ten years as the limits for the predictions in this paper, because futurists tell us repeatedly that ten years is just about as far as we can see. They argue that we tend to exaggerate what will happen in the next one or two years, because the normal bureaucratic processes, including committee meetings, study groups, and unreturned phone calls and unanswered letters slow the process down. We tend to underestimate what will happen in the longer term future because our predictions are largely based on what we know or expect, and we can't factor in what will happen about which we have no clue. Certainly libraries had no idea at the start of the 1960s what changes would be brought about by the ability to search online the files located across a continent or a planet. It has revolutionized banking and travel reservations, and quite incidentally in the minds of systems

engineers it has revolutionized libraries, and all because systems designers began to realize that one central processing unit could handle the messages from many input/output devices. We may well face such traumatic changes in the distant future, but I can't talk about them. Moreover, if I did nobody would remember or care whether my predictions were accurate 15 years from now, least of all I. Let me restrict myself then to talking about what is already happening, and what we can see quite clearly in the short term future.

Let me begin with three presumably unrelated stories, all true. You will probably see the connection, but in any case I will connect them for you.

1. For more than two decades, a bank in the northwestern United States had an excellent library, respected by all of its users. The librarian was well paid, and promoted to the rank of a bank officer. Then, about five years ago, as part of the merger mania that grips the banking industry, that bank was acquired by a large banking system hundreds of miles away. Decisions came from there, and the local professionals became simply distant employees. Finally, a new chief executive officer was appointed, and that individual had spent the last four years in Thailand. One of his immediate decisions was to close the library, since it was his assumption that all needed information could now be accessed online by the bank employees concerned. Furthermore, since there was no longer a need for a collection of printed library materials, he offered the entire collection to the local public library.

2. More recently, the midwest office of what claims to be the world's largest law firm called in its totally unsuspecting library staff one Friday afternoon and fired all of them. A consultant report had recommended that librarians were no longer necessary. In this case, the library would be maintained, with material ordered and filed by contract clerks. However, it was clearly understood that the firm's lawyers could find whatever they needed to find on their own, on their terminals and if necessary on the shelves.

3. In an article this spring, the American national newspaper USA Today listed ten occupations which, in the judgement of the editors, had a bright future, and ten occupations which they saw as having at best a dim but probably no future. The first list was heavily spiced with computer skills, such as computer animation for anyone who might hope to work for Walt Disney Films. The second list, of occupations which had no future, included bank teller, telephone operator, and librarian.

47

All right, let me start putting these pieces together, and let me start with the third. What bank teller, telephone operator, and librarian share, at least in the view of the editors, is that they are all jobs which involve clerical and repetitive routines, which have been and will increasingly be taken over by computers. Cash ATM machines instead of tellers, voice mail instead of operators, and easy to access and incredibly friendly and complete computer terminals instead of librarians.

If this last assumption surprises you, you haven't been watching the incessant ads from those who want to sell us online services and terminals. Obviously, bank and law firm officials had been watching those ads, and believing them. Let me restrict myself to two, and I am sure that their equivalents exist in Europe as well. In an America Online ad, an individual who is about to miss a basketball game because be has to go to the library is assured that going to the library is totally unnecessary because all he needs to know is available from America Online. And indeed, as the commercial unfolds, the printer spits out all of the needed information, and he leaves happily for the basketball game, something it is assumed that he would rather do than go to the library.

In the second ad, an off camera voice ushers us into the office of an obviously hard working executive. We know he is hard working because it is late at night. After brushing off interruptions while he is hard at work on his Hewlett Packard computer, the executive suddenly cries out in anguish. It turns out that he has hooked his golf tee shot into the lake. The message here is equally clear. Computer usage is fun, and the Hewlett Packard marketing people understand that it is fun and not just business applications that sell computers. Just ask your children if you are not sure. Of course, all of this creates great temptations to waste time on corporate and university computers by playing games instead of working, and we know that this is indeed happening. However, the marketing approaches are far much too subtle for us to notice.

The premise that end user computer access will suffice for all needed information, obviously accepted by both bank and law firm officials, plays right into the agenda of those concerned by the desire to downsize. Peter Drucker, way back in 1989, predicted the current frenzy of downsizing, and described it quite accurately. The immediate targets would be middle managers, facilitators, coordinators, teachers and guides - in other words the people who didn't really do anything to further organizational goals. They did not produce profits in the corporate sector, or generate tuition

dollars in the academic one. The second downsizing wave would target all those who did clerical work. Perhaps it did not have to be done at all. At worst we could replace regular employees who had status and benefits with temporary or contract personnel who might cost less, but who in any case could be easily disposed of. Drucker went on to predict that none of this would really work. Downsizing would not increase efficiency, or improve profits. However, he noted that this would not be admitted. The failure of downsizing to achieve its objectives would simply lead to the conclusion that we needed to downsize some more. We need look no further than the stock market to understand how all of this works. When a corporation announces that it will get rid of several thousand people, its stock immediately goes up in price. Nobody on Wall Street asks who those people will be, what they did, and who will do it in their absence.

One of the dangers for librarians then obviously is this numbers game, and the failure of the individuals who make these decisions to understand what librarians do and why it is important. That failure should not surprise us, because librarians go to great extremes, in both the corporate and academic environments, never to serve the officials who will make decisions about our future. Did the senior law firm partners and the corporate officials several hundred miles away really understand what the library did? It is not likely, because they probably never had any direct contact with the library. Does the president of the university really understand what the library does? What does it do for him - and remember he is not doing research but dealing with administrative choices, like any corporate administrator?

Part of the problem I have already mentioned. It comes from the incessant and highly funded advertising campaign that stresses both the ease and fun of end user searching. We obviously know better than that, and I don't need to elaborate in talking to this audience. Computers are incredibly rude. Invalid instruction is simply not something one says to a distinguished professor. Voice mail systems, of course, are even worse. Frequently I am answered by a recording which informs me that I have reached an invalid number, and tells me to look in the directory for the correct number - when in fact I obtained the incorrect number from the directory in the first place. Voice mail message menus are worse. I must endure a whole list of options, and when I finally select one I may get a busy signal. Fortunately, these systems still have not learned to cope with dial phones as opposed to push button phones. I pretend to be able to use none of these options, and I eventually get an operator.

How many users would prefer to reach a reference librarian? If we allow the downsizing frenzy to reduce the number of reference librarians, and then most disastrously if we adapt the level of service to the reduced capability rather than carefully orchestrating a crisis of service deprivation which we then present to our management as its problem, we end up not only validating the staff cut but preparing the way for the next one.

Librarians, then, are an obvious and easy target for those seeking to downsize organizations, and much of the publicity from computer and database vendors suggests that this is a valid approach, particularly for individuals who 1) don't really know what librarians do because those librarians never serve them directly, and 2) have an innate suspicion of anyone assumed to simply manipulate files without really doing anything.

Consultants, who have the responsibility of recommending some sort of cost savings to justify their own fees, will follow that same course of least resistance. I must emphasize that none of this is really aimed directly at librarians. There is no anti-library lobby. Rather, it is aimed at particularly handy and certainly powerless victims. We want to eliminate people, and these people are handy and presumably unnecessary. Certainly nobody else will fight for them at the risk of their own jobs.

However, the greatest justification for eliminating librarians in a time of downsizing really comes from librarians themselves, and academic and public librarians on the one hand, and corporate librarians on the other, are equally guilty, but for very different reasons.

Academic and public librarians have always seen themselves primarily as educators, even as our fellow educators spurn us as full and equal partners. The premise of much of librarianship is teaching our users to be able to find for themselves in an information environment. End user training and bibliographic instruction are all approaches designed to teach others what we know, so that they can then function on their own. However, once they can function on their own, where is the need for us? It begins to look very much like a self-selected role of facilitator, coordinator, and lifetime teacher, all job titles which are very much under suspicion in the present environment. Job security comes most simply and directly from doing something that: 1) needs to be done because the requirement is urgent, and 2) nobody else knows how to do.

Plumbers and automobile mechanics understand this process much better than we do. I know of no workshops or training programs in end user plumbing or end user carburetor repair. If your car breaks down or your pipes burst you are helpless, and that is exactly what they had in mind. I could make a non-selfish argument that our end users, confronted by an endless array of options and gigantic increases in the amount of garbage (and garbage is defined by any one user as something he or she did not want to waste time having to look at), need information access instructors far less than they need information lifeguards. Such an argument would quite comfortably serve both our users and us. However, even if that argument does not appeal to you, are we supposed to be so altruistic as to educate ourselves out of our jobs, abetted as we already are by a whole publicity campaign that already argues that what we teach is easily self taught and fun as well?

Special librarians (and I have been a special librarian as a practitioner and teacher just about all my adult life) have not accepted the premise that they should primarily be teachers. After all, the motto of the Special Libraries Association has been since the 1920s, and remains, "Putting Knowledge to Work", and that does not mean putting knowledge on the end user's terminal, or dumping it in endless piles on the user's desk. There has, in the last decade, been a considerable backing away from that rather straight-forward philosophy in the pages of the official journal of the Special Libraries Association. We are now urged to embrace end user searching both as a foregone conclusion and as a virtue. Apparently, some librarians have been watching these ads as well. Instead, it is suggested, special librarians (and the movement has its parallel in academic libraries) are urged to embrace the role of information advisors or information gurus. It is an interesting concept, at least hypothetically. However, in the present fervor for downsizing the gurus and advisors will be eliminated right after the middle managers, or perhaps even ahead of the middle managers.

However, the issue is far more dangerous than that for us. I know that the librarians at the bank and the law firm I just mentioned did an excellent job of serving their clients, as I am sure some university libraries do an excellent job of responding to the demands of faculty, and perhaps even occasionally listening to a student. However, in the present management scenario, serving your clients well is not enough. In an era of downsizing your users, who do not generally make overall management decisions, become your

rivals. We are going to downsize - do we keep researchers or librarians? - is not going to be answered to our satisfaction by any researchers, no matter how fond they are of the library or satisfied with its services. I am told that in both the bank and law firm lots of users came by to express their regrets. However, none of them volunteered to have their jobs eliminated in place of the librarians.

What special librarians failed abysmally to do (and I will broaden the discussion to academic and other librarians in a moment) is reach higher level management (the ones who never use the library personally because librarians don't seek out higher level management to address its needs) with a very simple message. The message is that keeping librarians is cost effective, because librarians can do, more accurately and more cheaply, what end users are now being urged to do. In other words, if you want to downsize and save money, add to the number of librarians, and lay off end users by the simple message of ordering end users not to do what librarians can do. As we all know from our studies of management, any job should be done by the lowest paid employee qualified to do it. Anything else is waste.

Would it really be that difficult to make that point, discretely of course? Does any law librarian doubt that he or she can do literature searching as well as lawyers, or medical librarians as well as doctors? It is not even necessary to be as good. If we can be only half as good, the fact that we are paid one third as much should make us more cost effective. And cost effective, I want to remind all in this audience, is a more important concept than cheap.

In an academic library the issue is a little more complex, but really the same. Academic libraries, certainly the ones I know, are also in great difficulty. Here librarians have allowed themselves to be maneuvered into an even weaker role. We are judged by the faculty not by what we do but by the collections we amass, and several decades ago a distinguished academic librarian like Robert Downs could argue that we would be judged not by the service we gave but for the collection we left behind us. Perhaps, but at best that was then, and this is now. More recently Robert Munn pointed out that the academic library was seen by the administration as a bottomless pit - the more you pour into it the emptier it appears. Certainly that observation is far more with us today.

But how and why did this happen? And more importantly, why have we allowed it to continue when it all became a disaster twenty years ago? Academic librarians in this audience know that the price of scientific and scholarly journals has increased at rates far beyond that of any inflation growth. Why these prices have increased does not matter, or at least it should not matter to us. Price increases beyond the norm are a problem for the vendor, assuming that the customer cares. The vendor can find cheaper ways to produce, make the product smaller by tightening acceptance standards, or by going out of business and leaving fewer vendors.

However, that is only if the customer cares. Here, the customers, who are university administrators and faculty, don't seem to care at all. Librarians of course do care, but librarians are not perceived as customers. They are perceived as purchasing agents. And so librarians try to survive in this absurd environment by eliminating subscriptions, but primarily by avoiding this process as long as possible:

1) by transferring money from monographs to journals;

2) by canceling the duplicate subscriptions to retain one of everything, even though we certainly know from our own literate about Bradford's distribution. However, it is the students who primarily need the duplicates;

3) by accepting poison pill budgets which give us more money for material but not for professional staff and continuing education.

Despite all of this, of course, collections continue to shrink, except in a very few libraries, and perhaps they should shrink in those as well (depending on what the other priorities are). And when collections shrink, the faculty become angry at us, and the administrators, whose only perception of the role of the library is that it not be a source of irritation for the faculty, then become annoyed at us.

The picture I am attempting to paint for academia suggests that, in a time of critical financial decisions and downsizing, we have as little a power base as corporate libraries. What then must our strategies be? Cynics might argue that academic administration is really an oxymoron, but at some point even here decisions must be made. What then is here the role of academic librarians in demonstrating their cost effectiveness - which really means simply that they are preferable to any alternative? I will have to begin

with issues of ownership versus access, something we should understand quite well from our literature, but something which non-librarians do not understand at all. We can no longer own everything we need, although some major universities will try longer than others, and will succeed longer than others. However, given the rate of publication growth and the rate of price increase, even these will ultimately fail, and it might be more prudent to cut their losses early.

We also understand that ownership does not equate to access, because many of the things we do presumably own cannot be produced on demand - they are charged out and not due back, they are lost or misshelved, they are at the bindery which may really mean they are in the back room ready to go to the bindery. For us all of these excuses may be important, but for the requester they do not matter. For the requester the impact is binary - either I get the material or I don't. During my last ten years at Indiana University I began undertaking sort of an informal survey among faculty colleagues. I will admit that my survey is flawed, because all of the individuals I asked were serious and intelligent people with a view of the larger world. None of them were petulant babies who knew a great deal about one little thing and nothing about anything else. I asked them simply this: "If a librarian can guarantee to you that 95% of the things you requested would reach you within 48 hours, does it matter to you where the material comes from? And if the answer to the first question is no, is it then any of your business what I initially buy and what I decide to obtain through other techniques - AS LONG AS YOU GET IT?" My survey response was very encouraging, although I admit my response population was flawed.

However, at some point the issue of ownership versus access will have to be addressed by the administrators who are responsible for our universities. When that happens, I hope that the recognized experts in making alternative recommendations are librarians. When (and I don't say if) access is finally taken seriously, there is no doubt that copyright laws will once again have to be addressed. I'm not remotely worried about that because, fairly or unfairly, revision in a political arena will certainly protect the interests of the larger body, the users. Still, I hope it is fair. I also believe that for anything to be done which individuals truly believe to be essential, cost becomes irrelevant, and that belief is also articulated by Peter Drucker.

What then of the second academic issue, the one that most parallels the corporate alternative? Are faculty doing things that librarians could do

more cost effectively? Are they doing it at all? There is a mystique in the academia I inhabited for over twenty years that faculty spend a great deal of time doing research. It is certainly true for a few, but not for very many. Ladd and Lipseth have reported that the average number of annual scholarly publications per faculty number is less than one. I found a surprising congregation of faculty colleagues during Christmas breaks heading for that most important of all research locations, cruises and warm weather beach resorts. When the University of Alberta Library offered online search training for faculty members, only a handful enrolled. A larger number enrolled secretaries and graduate assistants.

However, quite aside from whether or not faculty do information research, should they, like their corporate colleagues, do what reference librarians could do more cost effectively? What is the responsibility of the university president to see that this does not happen? Unless of course, the university already has too many faculty, and they have nothing to do anyway. Don't expect anyone to admit this. However, even if it were true, what an opportunity to downsize faculty by adding librarians and saving some real money!

Only in public libraries does the economic model on which I have so heavily relied because it is the one on which management increasingly relies become more complex. Work not done by professional librarians is presumably not done at all, or it is done by the citizens, whose own labors presumably cost government nothing. Here the strategy must be to raise the public expectation for what government must provide, even as we try to cut taxes and expenditures. That public outcry demanding better services works for police protection, it works for garbage collection, and it works for repairing the holes in the highway. If the public outcry has not demanded more professional librarian intermediaries, it may be because we have not orchestrated that demand. Of course, public librarians at least in the United States demonstrate the suicidal tactics one could otherwise only ascribe to lemmings. We accept Microsoft equipment from Bill Gates to help wean and train his future end users for him. Gates is a multi-billionaire, and I understand why this is a good deal for him. The computers he gives us are a good investment, and a tax write-off to boot. But what is in it for us? What else are we going to get?

Let me close by returning to Peter Drucker's accurate prediction of downsizing and the mechanisms for implementing and evaluating the

process. At the same time he made these predictions, Drucker also predicted that the most glorious and important profession of the future would be that of knowledge workers. Quite simply, knowledge workers would be crucial because what they did would be essential, and because nobody else could do it. It almost sounds as though Drucker was talking about plumbers.

Do we have any desire to claim the role of knowledge workers? I have seen little indication of it, and certainly the editors of USA Today who equate librarians with telephone operators and bank tellers have not seen it, either. That is the fork in the road I see in front of us, and I wish I could be more optimistic about our choices and our strategies to accomplish what I think we could still accomplish, but not without a major reassessment.

56

The Need to Add Value

Ray Lester
Natural History Museum, London, United Kingdom

Ray Lester graduated in chemistry and took a Ph.D. in chemical pathology. He worked for Unilever as an information scientist/systems analyst, and in a number of UK academic libraries before becoming Librarian of the London Business School. In 1990 his role at the School widened to encompass responsibility for information technology. In 1996 he moved to his present post where he has overall charge of all of the Museum's archive, library, computing, database and publishing operations.

Abstract

It is now a truism that libraries will need to change radically if they are to survive the networked era, and not simply be closed down because they are no longer perceived to be needed. In a world where any information in any form will in principle be able to be sent from anywhere to anywhere 'at the touch of a button' everyone realises that the anticipatory 'just-in-case' role that libraries and their librarians have traditionally performed comes under threat from 'just-in-time' solutions.

Yet the global information system within which each individual library is just one small player is extraordinarily complex. This means that it is very difficult for those in charge of the destiny of

libraries effectively to plan for the future. It is not that we lack information: every month yet more and more 'relevant' papers, reports, books and so on appear, yet more conferences, seminars, workshops and so on are held: all grappling with one or another aspect of library futures. The problem is summarizing and organizing all of the resulting facts and opinions into a form which 'top management' can and will respond to with confidence, if not even enthusiasm!

A classic method which policymakers use in such situations is the creation of a model. This paper develops a model which it is hoped is rich enough to be faithful to the underlying complexity it represents; yet not so rich that it overwhelms the (non-specialist) decision maker. The paper is in the form of an Experiment - whereby the Director of a Research Library explains to the Library's Board of Trustees, why the Library should not be closed down as had been suggested by the parent institution's Director of Computing. The reader is invited to judge whether the Experiment is a success. And, if not, how he or she would respond to such a challenge!

Introduction

The core of this paper is an experiment. In a moment we will imagine that we are in an Institution which has a significant **Research Library**. I will play the role of Library Director; you will try to imagine that you are a Member of the Institution's Board of Trustees. I have tried not to make this a terribly serious Paper! However, I believe that the issue which I am trying to address is a serious issue.

The Director of Computing of the Institution has proposed that the Institution's internal Research Library - a Library almost wholly financed by the Institution from its internal funds - be phased out. The funds so released once the Library had been abolished would be used to enable the Institution's scholars and scientists to purchase the published information they needed in the future via network access to remote collections of publicly available documents and data held in other libraries and data centres. The Computing Director has already helped to set-up an external company which will facilitate that process of document and data acquisition.

As Library Director, I have been summoned by the Board to respond to the proposal of the Director of Computing. I have just 26 minutes allocated for my initial response!

The experiment, I trust, will throw light upon two questions:

- First, is it possible within 26 minutes to bring non-specialists to a point where they can start to engage meaningfully with the complexities surrounding the future of research libraries? Or is such an attempt a fruitless exercise: at best, unhelpful; at worst, positively misleading.

- Second, does a model help? The use of graphics does not seem common in writings about research libraries and their futures; at least, not in the sort of written and verbal presentations aimed at practitioners - like myself - rather than at researchers on library futures. Is this because most of those who make such practically-orientated presentations do not think of libraries as agents within communications systems which can be modelled? Or is it because they realise, again, that any attempt to represent on one diagram the key flows of scholarly and scientific communication - as I will towards the end of this presentation - simplifies the whole to the point of banality?

If, at the end of the Paper, your answer to one or both of these questions dooms the experiment to failure (and please make such allowances as we go along which you feel are necessary for any incompetence on the part of this particular playwright-cum-actor!); if, despite the use of a simple model, or perhaps **because** of the use of such a model, you feel that it is impossible within the attention span of the average top decision-maker to communicate the key strategic concerns surrounding the future of research libraries, what then? For it seems to me that a Research Library Director's prime **need to add value** these days must be in the very process of persuading those who would fund the Library (as well as the Library's customers and its staff) to buy-in to the fundamental changes ahead for all research libraries. If what follows is not the way to start that process of obtaining such commitment, what is the way?

One further question for the reader before we start the Experiment. I shall conclude my presentation to the Board of Trustees of which you are a member by identifying seven key strategic concerns surrounding the future of research libraries. By definition here, each of the strategic concerns is outside the direct remit of the Library Director. Four of the seven strategic concerns are parent institutional matters; three are extra-institutional

matters. I shall use **Figure 1** to map the seven. What, ahead of reading the Paper, do you feel personally are the key strategic concerns which boards of trustees of research libraries should currently be focusing on?
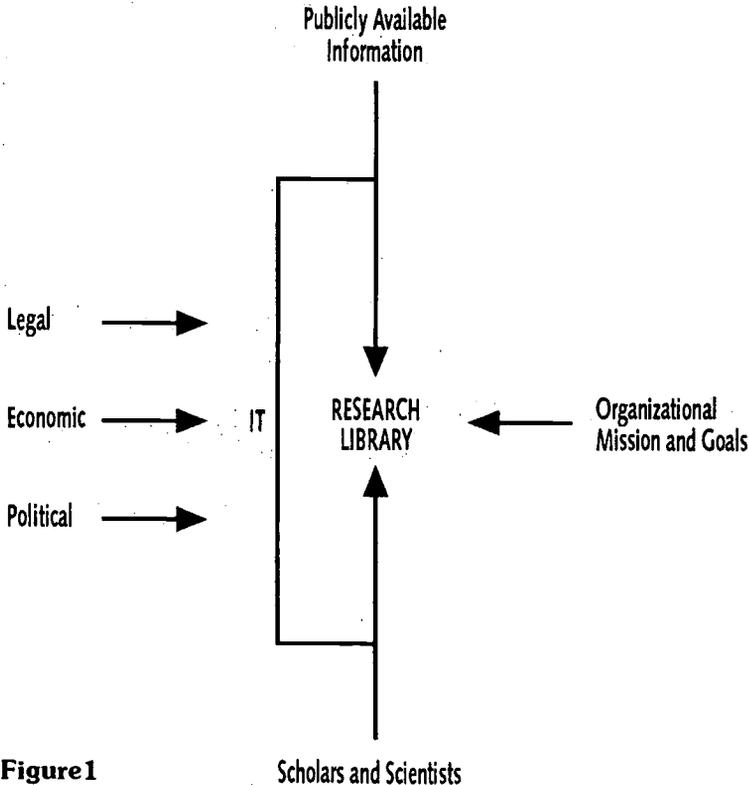

Figure 1

OK. You are a member of the Board of Trustees; I am the Library Director.

The EXPERIMENT

"Gentlemen (and lady). In considering the future of our Research Library, there are seven questions of strategic importance, our answers to which will critically influence the response we should make to the proposal of my

learned colleague. (And can I say how grateful I am to her for showing such interest in Library affairs.) Before I review the seven concerns - all of which, by definition, are outside by current remit as Director of the Research Library - I need to remind you of the key characteristics of the traditional paper-based research library; and how these are being radically affected by the electronic imperative.

Libraries generally intermediate between those who produce information artefacts for the public domain (articles, books, reports, collections of data, and so on), and those who need to use such artefacts: in this context, our Institution's scholars and scientists (**Figure 2**). I use the phrase 'scholars and scientists' for all within this Institution who wish to make use of publicly available information artefacts. This would include, for instance, our Ph.D. students.
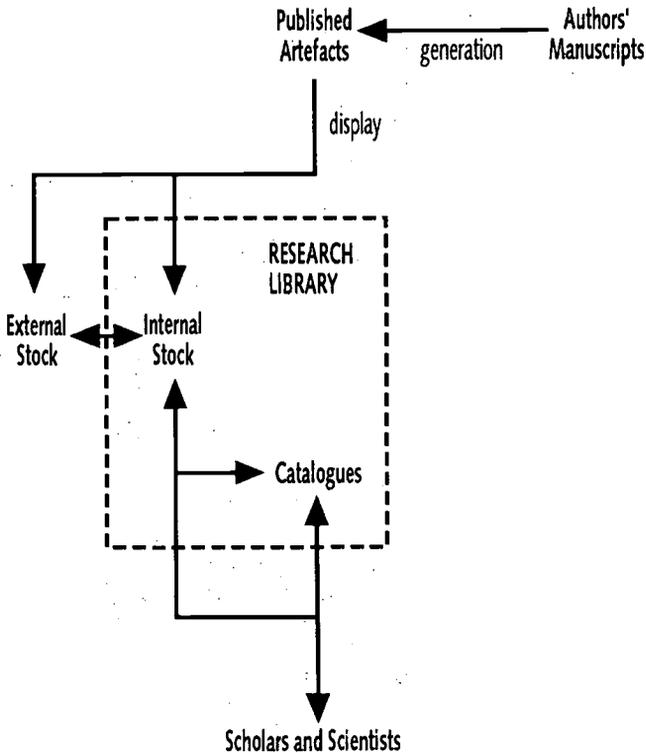
Figure 2

The traditional library - still very much with us - intermediates in perhaps four main ways, the strength of use of each way by a specific scholar or scientist dependent on a number of subject discipline-related factors, such as:

- how fast the subject area moves; and thus the extent to which the older literature is important;

- the balance of needs for access to fact, fiction, or opinion;

- how important the subject area is to our own institution; and thus the extent to which we can justify devoting library resources to create a resource of critical mass faithful to its current state-of-the-art;

- whether the subject area is emerging, with thus its researchers need access to a relatively wide range of literature until its paradigms - and its core journals - become more closely defined;

- ease of access to close-by libraries which provide better coverage of the subject area than does our own library, where such libraries exist;

- how established an individual scholar or scientist is in the appropriate invisible colleges: those global groupings of researchers who communicate their research results to each other ahead of formal publication: via pre-prints, items for review, the telephone, attendance at conferences and meetings.

... and so on.

The use of the four key types of library facility/service I have identified thus will vary considerably across this Institution (and we must never forget that 'use' does not necessarily reflect the satisfaction of real 'need'). The four types are:

- First, the routine acquisition of information artefacts - such as current issues of journals - in anticipation of customer demand: 'just-in-case'.

- Second, the archiving of acquired artefacts - artefacts over which our library, and thus its parent institution, can often claim to have some element of intellectual property ownership.

- Third, interlibrary loan, the obtaining for scholars and scientists of copies of items not held, or not yet held.

- Fourth, the creation of tools - I simply use here the term 'catalogues' - which facilitate the identification and location of items the library holds.

Before outlining how the electronic imperative is affecting our Library, let me give you just a glimpse of the complexities which arise when one is managing a storehouse of information artefacts - a library - rather than managing, say, a storehouse of automobile parts. These complexities arise irrespective of whether the manager of the 'storehouse' continues to be someone within the Institution (such as myself); or is one or another manager outside the Institution, to whom we have in effect outsourced our Research Library. The complexities are representative of three key challenges inherent in the Director of Computing's proposal:

- The need to get the economics right;
- The need to ensure that someone, somewhere will hold for posterity the archival materials our scholars and scientists will continue to need, if our Institution chooses not in the future to hold them;
- The need to deal with intellectual property matters;

(a) *Economics.* Each session, the Library buys less information than it did the previous session. This results from a combination of:

  - constraints on the overall amount of money the Board is able to devote to its Library;
  - the need to use proportionately more of that money to satisfy customer demand for the sorts of electronic services we will come to in a moment;
  - the steep increase year on year in the price per item of the information artefacts we buy: especially of the prices of the scholarly and scientific journals. Since the production of such journals is highly capital intensive, decreases in total numbers of subscriptions leads to increases in prices, which leads to further decreases in subscriptions, and so on and so on in an inflationary spiral.

(b) *Archives.* Although some of our archival holdings obsolesce to the point where their future expected usage is so small that they can be safely discarded (there is always interlibrary loan), many must be retained. We do not throw out the letters of Charles Darwin, historical recordings of the sounds of blue whales mating, prints of Audubon's birds, or film of

the Tasmanian wilderness, just because new text, sound, image or moving image is published. For much of the scholarly and scientific work carried out in this institution, it is the information artefacts themselves which are the objects of research.

(c) *Intellectual Property.* You will be aware that since the invention of the photocopier it has been the norm for journal articles which are re-quested on interlibrary loan, not to be copied per se, but to be photocopied. As this practice potentially deprives the publisher of the journal of sales of the relevant journal issues, there has been increasing pressure - and some success on the part of the publishers - for royalties on copying to have to be paid. This has been particularly the case for electronic information artefacts. Generally, libraries do not enjoy with electronic artefacts the same freedom to make copies free of royalty payment (so-called 'fair dealing'), as they do with print artefacts. More generally, there is much discussion at the moment of the journal publication system moving from the present delivery of print journal issues containing a group of articles by different authors and obtained by advance subscription, to the individual article becoming the prime unit of communication. Users would then order the articles they need electronically - after the articles' identification and location - paying for the articles there and then; and every time subsequently the articles were needed. Since generally, scholars and scientists do not know the worth of an item they are unfamiliar with until they have perused it, the industry is trying to devise systems which will electronically allow just enough of an article to be displayed to assess its worth; but not enough to obviate the need to obtain the full work and thus remit the appropri-ate fee, if that then seems worthwhile.

Metadata

We are increasingly using the word **metadata** to describe generically the sort of electronic intermediating tool which I have just described. Metadata describes individual information artefacts. It also describes objects at different levels of agglomeration right up, say, to research libraries and research institutions. In a virtual environment, metadata is essential.

In fact it was one specific and important metadata tool - the library catalogue - which was the first to be seriously affected within our own Research Library by the IT revolution (**Figure 3**). The result is that library

scientists - in contrast, I might say, to computer scientists - now have a detailed knowledge of how such critical tools are best constructed. Computer-based catalogues of our library stock were provided some 20 years ago, which then as feasible become networked throughout our Institution. These online public access catalogues (OPACs) until recently generally only provided access to the non-serials in our collection.
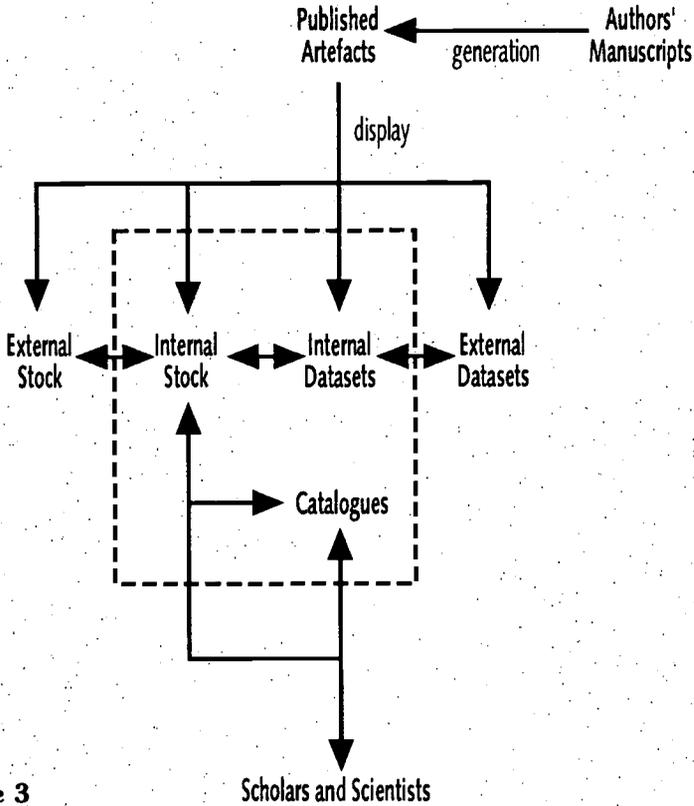

Figure 3

Meanwhile, the professional and commercial abstracting and indexing services for the various subject disciplines began to make their datasets - their metadata datasets - available for searching via wide-area network connection. Partly because search of these secondary services was often costly, but partly also - it has to be said - because my librarians persuaded me that the searching was complicated and needed the services of a

professional librarian acting as intermediary, the bulk of the online data-base searching in this Institution was channelled through our library. But then in the late 80s came mass storage compact discs (CD-ROMs), many of which - in contrast to datasets of primary literature - could be networked across the institution and provided for unlimited use. We simply paid an annual fixed subscription. As concurrently many particularly of our younger scientists and scholars become highly digitally competent, so those scientists and scholars realised that database searching was not at all complicated. This is the case provided and crucially:

- each database is well structured;
- its interface is user-friendly;
- the documentation and online help keys are well designed.

These are all jobs library and information scientists are increasingly expert at designing and providing.

Unfortunately, such added metadata value in catalogues and similar secondary tools does not come cheaply. And this aggravates one of the key problems faced by the scholarly and scientific communication system. Each unit of communication is used on average by a very few scholars and scientists world-wide. Many articles, monographs, reports and so on seem not to be referenced - cited - again after their first formal publication (except perhaps by their original author). But this low average usage and citation hides an immense - and, for the most part unpredictable - variation. We know that in the research of our own Institution, however hard we try to attract the best scientists and scholars to join our ranks, our overall research outputs will not uniformly be world-class. Similarly, however hard our Research Library tries to acquire the best literature published (whatever we might mean by 'best'), nevertheless there will reside on the shelves items which seem never destined to be used: until one quiet evening, a prospective Nobel prize winner - browsing amongst our library printed stock - stumbles upon just the nugget he or she needs.

A key question - perhaps the key question - we need to ask ourselves in response to the Computing Director's proposal, is whether a highly specified personal computer workstation linked via very wide bandwidth telecommunication channels to comprehensive external datasets will allow the discovery of the unexpected which happens when human beings are allowed the physical and mental space to browse amongst print-on-paper information artefacts. Assuming that we successfully can as an Institution

address the seven strategic concerns which I will come to in a moment, can we create a virtual library environment which truly will continue to show the advancement of scholarship and scientific knowledge for which this Institution is renowned?

My answer is YES - provided that we properly address the **metadata**. Issues. As you will know - members of the Board of Trustees - from all of the popular polemic articles which have been written in the last year or so, the Internet, which is now expanding within this Institution as an Intranet, allows via the use of a World Wide Web technology interface, all who wish seamless network access in principle to a wide range of services (**Figure 4**); including:

- all of the internal and external datasets to which I have already alluded;

- remote library stocks, some of which provide automated credit card payment document delivery services, and many being the same libraries with whom we formerly transacted interlibrary loans;

- critically also, via electronic bulletin boards and discussion lists, access increasingly to the informal scientific and scholarly information which is the stuff of the invisible colleges mentioned earlier.
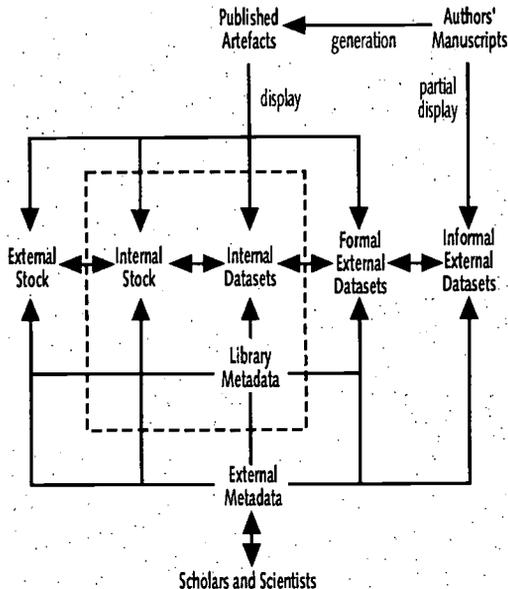

Figure 4

Development of the last facility may well break the grip of the commercial journal publishers - provided ways can be found truly to replicate the accreditation of articles provided by the publishers and their editorial boards. A tremendous amount of work is taking place within that arena.

It is the technological promise of a seamless Internet/Intranet and World Wide Web that no doubt persuaded our Director of Computing to propose in effect a future represented by the model in **Figure 5**.
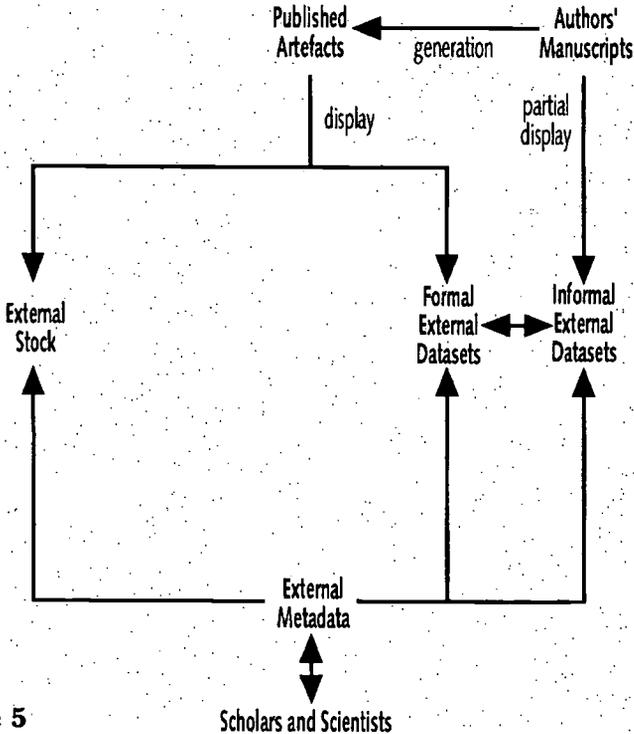

Figure 5

But in contrast, members of the Board, I would argue that the exciting technological promise of the Internet/Intranet/World Wide Web will only be fulfilled if we can bring order to the tantalising cornucopia now available at our scholars' and scientists' computer workstations via electronic networking. Such an order can only be provided by creating a specifically tailored metadata architecture for our Institution (**Figure 6**).
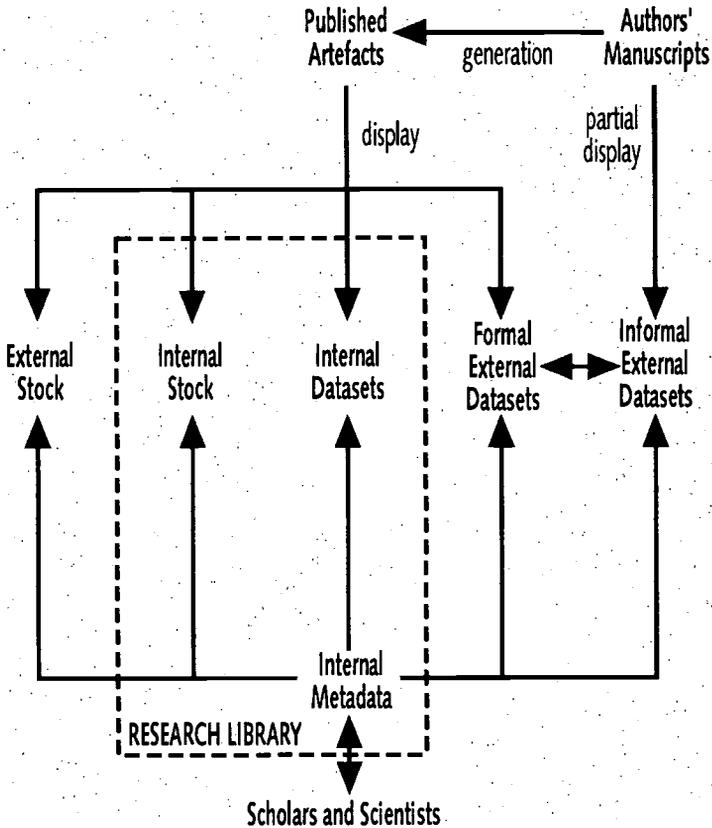
Figure 6

We **can** gradually reduce our scholars' and scientists' dependence for their research on an internal Research Library of printed journals and books and so on. But this only if we provide an intermediating, value-adding interface to the cornucopia - an Internal Metadata - which will automatically mimic the interface provided by our present Research Library and its staff. Importantly, this Internal Metadata will be an interface which is especially tailored to the specific information needs of our own scientists and scholars. The networked electronic world out there beyond our Institution's walls is now just too complicated and extensive for us to assume that it is just a question of conduit. Content matters!
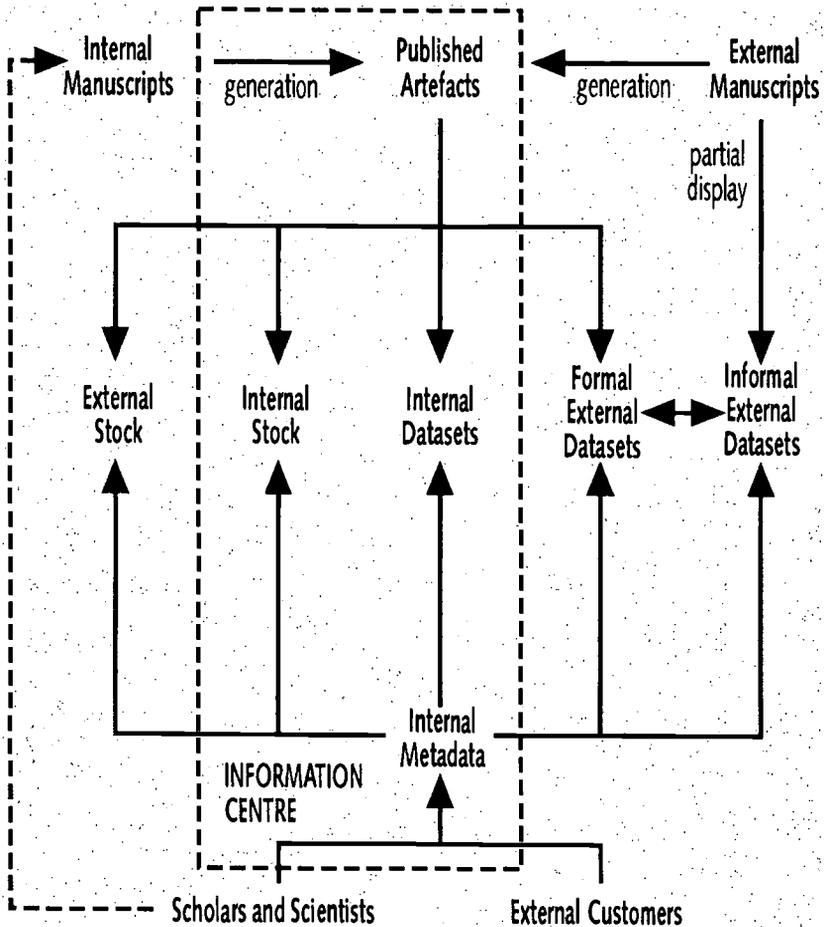
Figure 7

I would go further (**Figure 7**). In talking about 'breaking the grip of the commercial publishers', we must not forget that this Institution is a significant publisher in its own right. I believe that the work my Library - or, better, my **Information Centre** might do in creating an advanced metadata architecture, could then be used to generate significant extra income electronically from people external to our Institution.
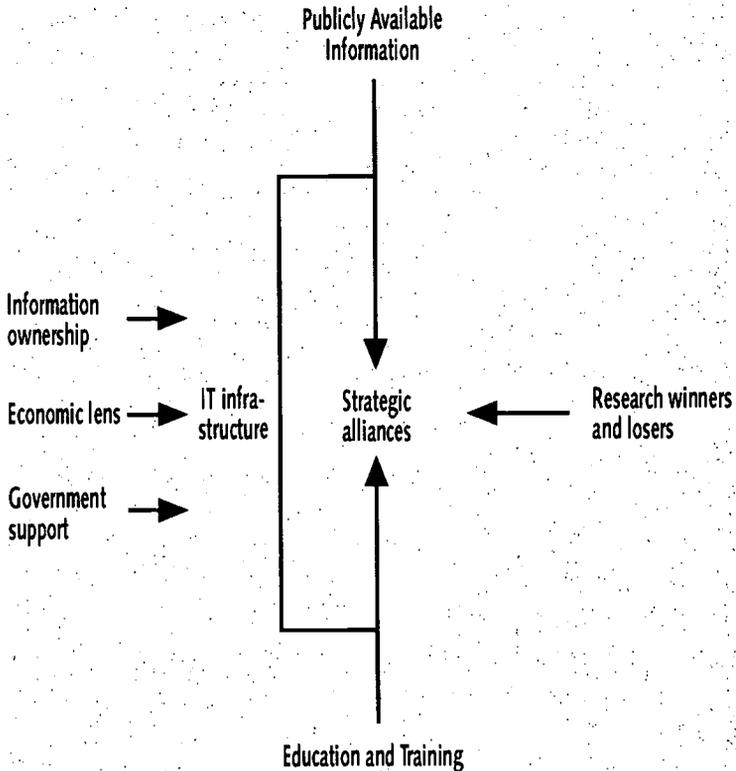
Publicly Available
Information

Information
ownership

Economic lens   IT infra-   Strategic   Research winners
                     structure   alliances   and losers

Government
support

Education and Training

Figure 8

However, none of this will happen as it should without us first as a Board
addressing seven strategic concerns (**Figure 8**):

a) First, it is essential that we continue to invest in and maintain our internal
   IT infrastructure. Much has been achieved in this direction by our
   Director of Computing. But I have to say, from my perspective, that
   much more remains to be done. To be frank, we just do not currently
   have the bandwidth and workstation capabilities that would support the
   Director's proposal. I tremble to think, for instance, how our Ph.D.
   students would cope. The Computing Department are only now getting
   to grips with the switching, intranet and web technologies which will
   form the backbone of future systems. There has been a sad lack of
   strategic vision.

b) Second, we must agree as an institution that we will need to devote significant resources to the **education and training** of our scholars and scientists about the radical changes that will affect their Library. Many older members seem blissfully unaware of what must and will happen. As this process of reorientation proceeds, each scholar and scientist will need to be trained in the new ways of doing things. The institutional-wide metadata systems which I have proposed the Library develop will be an invaluable help here.

c) Third:

- given that, despite the electronic imperative, this Institution will need for some years - if not for some decades - to maintain an in-house collection of print-on-paper library stock and datasets over which we have an element of ownership;

- given that at least until the underlying micro-economic system fully adjusts itself, the gradually alternative use of external stocks and formally published datasets will usually incur significant day-to-day marginal costs;

- given that there will be continuing financial pressures on the Institution as a whole so that the Board will very likely be unable to increase the amount of money in total it is able to devote to 'library-type' activities - both real and virtual ...

... tough choices will have to be made on which scholarly and scientific groupings will get in the future a top-grade research library service, and which not. This is not a decision which I, nor the Director of Computing, can make. What this Institution must not do, I would suggest, is duck the issue of **research winners and losers**.

d) Fourth, so much of the scholarly and scientific communication system - and, indeed, of the overall research system itself - is directly or indirectly dependent on **government support**. We must not fall into the trap of, for instance, abandoning support for some aspect of our Institutional Research Library in favour of remote access, until we have assured ourselves that the means of access to the remote facility will continue to be financed and made available to our scholars and scientists on the same conditions as now. If we anticipate that such will not be the case, we must fully take that into account in our planning. Clearly, the international dimension of the Internet further complicates matters here. Members will be aware of how congested that network has become

recently. So much talk of using this or that remote dataset via the 'information superhighway', instead of maintaining the dataset in-house, is predicated on continuing government financial support of the means of access to the remote facility. So many of the existing services available via the Internet - especially those concerned with metadata architectures - are in fact currently directly or indirectly supported by one or another government or international agency (such as the European Union). What will happen when the grants run out? We must make a realistic assessment of what is likely to happen and crank that into our strategic planning.

e) Fifth: the tortuous issue of information ownership. We must very carefully follow the national and international legislative developments - particularly as regards electronic information artefacts. The multimedia area is especially problematic. There are also of course serious questions which I know that the Board has recently had to address concerning the ownership of - and thus the right to receive income from - information generated by scholars and scientists within our own Institution. Answering these questions has been given an added urgency as the Board seeks to maximise the revenue the Institution as a whole earns from its own publishing operation. Meanwhile, other institutions whose internally generated information artefact stocks and datasets our own scientists and scholars might use in the future, are also seeking to maximise their revenue. All institutions these days are under pressure to increase the income they gain from their internal library stocks and datasets - to the extent the intellectual property laws allow them to do that. The idea that down the road, or across the Internet, there are kindly benefactors who will allow our scientists and scholars freely to copy their information artefact holdings, frankly is increasingly nonsense. Key here is the question of **information ownership**: and what that ownership allows you to do, particularly in an electronic environment. We must also always remember that each initially generated piece of intellectual property is unique: there is no substitutability, as there is with so many other electronic goods. That fact can have dramatic effects on pricing.

f) Sixth, following directly on from that, it is I trust clear that the scholarly and scientific communication system is a highly complex economic animal, with a large number of players and stakeholders, each with their own agenda for the future. Some of these agendas would directly compete with our own agenda - to the extent that is yet articulated. In

this short presentation, I have only been able to give you a hint of the overall economic complexity. As I have implied, there are a variety of perspectives which we can use:

- to try to understand what is happening now in the overall communication system with which we are concerned: the links between publicly available information, and scholars and scientists;

- to hypothesise what could happen in the future;

- and then to agree what will happen in the future, for our Institution.

What I would urge on the Board is that the perspective that should - as it were - override all other perspectives in such a strategic process is the economic perspective: the use of an **economic lens**. I am not an economist. And those of you who share that state no doubt like me frequently find the economists' ways of looking at things frustrating. But, at the end of the day, of all the key resources - land, labour, capital ... **and** information - it is the absence of capital which will undermine the best laid strategic plans. We, and all the other players and stakeholders we must interact with, can buy the extra land, can buy the extra labour, can buy the extra information (including the technology to handle that information). But we and they by definition cannot 'buy' the extra capital.

g) Lastly:

- given all the economic, legal and political uncertainties within the national and international environments of scholarly and scientific research;

- given the need to engineer significant change in the perceptions, practices and expectations of our scholars and scientists, including of the relative extents of support of research in our difference subject disciplines;

- given the fact that we must devote yet more capital and recurrent resources to support of the IT infrastructure which will form the bedrock of our future prosperity as a research institution ...

... it is essential that the changes ahead are actively managed. We must forge external **strategic alliances** with not-for-profit and for-profit players in the overall research information industry, building on the good work the Board has already done in positioning this great Institution so that it can meet the challenges of the next millennium. But our Research

Library must also be encouraged to form internal strategic alliances, especially with our internal computing and publishing operations. In fact, I suspect that we must go further than that if we are truly as an Institution to fulfil our destiny. Those concerned with communication within this Institution need a single strong coherent voice. And it is in that spirit that I would use this opportunity respectfully to propose:

The Library Director be invited to become Keeper of Information Systems, in overall control of all of the Institution's computing, library and publishing operations. The post of Director of Computing be phased out.

Thank you."

Educating Librarians for a Worldwide Library: Skills and Curricula

Irene Sever
Haifa University Library Studies, Haifa, Israel

Irene Sever (B.A. Hebrew University, M.A. Haifa University, Ph.D. Sorbonne, Paris) is Senior Lecturer and Chair of Library Studies of the University of Haifa. After working as information expert in several scientific institutions, she changed course to anthropology and communication, and began to concentrate on library services for children and communicative skills of children and librarians. Together with Shmuel Sever she has created the Laboratory for Children's Librarianship, a research facility for observing children acting in a library milieu independently from adults. She is the author of books as well as several articles in periodicals. She is also an active member of the Round Table on Research in Reading of IFLA.

Abstract

The decade which straddles the millennium: 1996-2006 will need librarians and information specialists who are masters of both book forms and electronic retrieval. The access to information world-wide has its advantages but also many drawbacks: countries with advanced technologies at their fingertips will push for increased reliance on electronic means of communication and retrieval while large parts of the world will be unable to develop at such a rapid rate. There are few viable solutions to the growing chasm dividing societies based on instantly retrievable information from those where even books may still be catalogued on handwritten cards. Bridging this gab may be the biggest challenge facing librarians and library educators during the next decade.

The coming decade finds librarianship at cross-roads in more than one sense: first, the increasing reliance on electronic means of information retrieval, the creation of an enormous pool of information that can be shared by all computer literate populations of the world, the increasing reliance on a world-wide net of satellite connections, telephone lines and optical fibres that create a common database of hitherto unknown proportions, all these and their future development seems to lead to a world based on information and its efficient retrieval. Second, the commercialisation of information has created networks of information that exist and proliferate outside conventional library lines, and librarians as well as individuals in the information society are evaluating their information needs increasingly in economic terms and according to the speed and efficiency of retrieval, in which process libraries may or may not be the most efficient way to information, even though they may be the cheapest and most convenient way of acquiring it. Economic forces at work in the transformation of industries formerly driven by manpower into technically and informationally advanced manufacturing are forced to calculate closely the advantages and cost effectiveness of information retrieval in industrial and service frameworks. But thirdly, and to my mind most ominously, a chasm seems to emerge between information societies and those that lack both the infrastructure and the economic clout to enter the information age.

Of this last development, several warning signs can be pointed out:

Illiteracy seems to be again on the rise: the educational progress achieved in some countries in the second half of the twentieth century have foundered or barely survived in the political and economic uncertainties of the past decades. The massive population movements caused by wars, civil disorders, famine and natural calamities have wrecked the often fragile educational structures. Advances in adult education have been lost in some countries. Even countries of the well educated West are worried by increased numbers of functional illiterates among their economically weak populations.[1]

Political and economic pressures have been affecting libraries as well. Those in existence have lost budgetary support, have had their manpower cut, their acquisition budget slashed, their plans for better buildings and renovations shelved indefinitely. New libraries are slow to develop and often start operating in restrictive conditions. This trend also comes to the fore when, in the USA for instance, one library school after another closed

in the late eighties and early nineties, as if there existed a consensus that libraries and librarians are no longer as necessary as before. It is doubly unfortunate that these developments occurred exactly at the onset of the information revolution leaving the established librarians of the print era to deal to the best of their abilities with a profession that had practically changed overnight, while the remaining library schools needed time to educate and create the "new librarians". In their quest after the best information librarian they may have changed the emphasis from serving the general public to serving the rapacious information needs of those who can afford to be information wise, while the poorer and weaker sectors of the general population have seen their share in the free and available library services shrink steadily even in well-to-do countries.[2]

Library education has mostly been on two levels: services to elite scientific groups and the so-called "general public" with all that is implied in that term: children, adults, senior citizens, the handicapped, the students and the informally educated. While library education was supposed to create a librarian capable of dealing with both types of patrons, this has become an increasingly difficult task. For the elite, the information needs have become sophisticated beyond the skills of the usual user and require ever higher levels of assistance from librarians specially trained in information retrieval and organisation. For the "general public" librarianship has meant numerous non-book forms of material that all require special knowledge and training for an effective presentation as well as increasingly sophisticated services to help special groups. Librarians dealing with preliterate and literate children and with young adults today cannot be trained effectively any more just by apprenticing them to a knowledgeable and efficient librarian: the media in their various forms demand of the librarian special training. Computer literacy, visual literacy, cognitive and developmental psychology are more and more part of the librarian's kit of skills. Communications skills, until recently considered helpful, but not indispensable are beginning to figure more prominently in the curricula of library schools.

I do not wish to present a picture unbearably gloomy of today's library scene: things are not as bad as all that in many cases. It is the empty half of the glass that worries me as a library educator and I suppose others like me expected to produce a professional jack-of-all-trades librarian: the librarian who navigates confidently in the often choppy waters of WWW and Internet, while providing preliterate children with the best library services that civilised society has to offer. I feel this most keenly while

preparing the curriculum of my library school, which I am fated to do every year. Last year I believed I had it all thought out: information skills, and more information retrieval and even more information was the answer: a country like mine with very sophisticated science and technology as its sole economic asset only needed to hone its information skills, which admittedly were somewhat rusty and antiquated and my students would conquer all the peaks of an information society. Oops, sorry! at this very moment in time, this theoretically advanced modern country was coping, rather badly one must add, with a massive inflow of immigrants from rural and urban areas of Ethiopia and the Asian parts of the former Soviet Union. Both immigration groups had an unproportionally high amount of people with sophisticated academic skills: doctors, scientists and engineers of every kind and description. But side by side with these eminently employable people came a large number of new immigrants whose former skills were absolutely unsuitable for the economic and social conditions of the country. The doctors and other professional people only needed to be retrained so as to learn the techniques of their new environment and could begin their new lives. The librarians had to be retrained as well, to help them adapt to the culture and mentality as well as to the language of their new country. The librarians who arrived could be retrained professionally, but computer literacy and information retrieval made additional demands. It was not enough to have to master such a language as Hebrew and perhaps learn some Arabic, but English also is indispensable in today's information society. I am mentioning these peculiarly Israeli conditions, because they seem to apply to other countries as well. I suppose that librarians from erstwhile Eastern bloc countries or librarians moving to and fro between less and more developed countries, have to go through similar adaptational processes, wherever they find themselves.

So, what kind of librarian must we have to tide us over the next decade? Attempts to sketch out future developments in librarianship are scrapped by reality as fast as they can be formulated. It seems to me that the present condition of constant flow of people around the world and their adaptation to computer societies will be one of the challenges of the new decade. The future librarian will also have to operate in a world sharply divided between electronic sophistication and basic needs, between electronic media and book forms. Even more importantly, the librarian, if he or she are to make the transition outlined here, will have to become a middleman or -woman between two forces that are progressively pulled apart: the book and media

needs of the general public and the information needs of the scientific and professional elite.

Today's professional librarians are adapting to the new conditions forced upon them by the information revolution. By up-grading their skills and their computers, they keep ahead of developments to the extent that demands made upon them are increasingly sophisticated. School and public librarians in countries like mine proudly display their badges of modernisation: the computer, which not only serves as a cataloguing, classifying and circulation device, but also connects to Internet and has a CD-ROM player. To my, somewhat jaundiced eye, the fact that this electronic miracle sometimes sits in a library boasting 1,000 book items and 3 CD-ROMs, brings down my level of enthusiasm. I mildly comment upon the fact that today, the user of Internet is supposed to have a vocabulary of English and the concomitant skill to spell English words correctly, something that only part of our children and youngsters reared in Hebrew and Arabic are capable of.

Nevertheless, here are visible signs of the electronic transformation of public and school libraries: non-book forms, formerly shunned as unnatural, pernicious and stultifying for young minds have gradually become acceptable and even desirable. Public librarians discuss CD-ROM collections, evaluate emerging "living books" and in general seem to accept the new media, something that even five years ago seemed unthinkable. The young, enthusiastic customers of computer games are becoming computer literate, and parents have resigned themselves to the fact, that when they are in trouble with their personal computers, the best thing to do is to holler for the nearest ten year old to set them right. Librarians respond to the demands of their young users and have watched with satisfaction, that besides banging away at keyboards and manhandling joysticks, the contemporary kids also read books. Even their English is improving under the pressures of reaching the next screen in the currently fashionable quest.

Computer literacy has become a household word: it has gone through stages similar to those of conventional literacy. Literacy at a minimum still means "knowing to sign your name", and at best "knowing how to read and write". World statistics on literacy are a problem because of the different definitions of the word. Computer literacy at its most basic meant until recently knowing how to make minimal use of a PC, something even preliterate children can do. However, the problem the world is facing today is INFORMATION LITERACY which is a different matter altogether[3]. To

achieve literacy a nation needs schools, teachers, teaching materials and premises. This can be achieved at a bare minimum on benches under a sunscreen in backward rural areas, with scraps of paper and old-fashioned slates. The results achieved are not that far from those arrived at in air-conditioned schools with computerised teaching aids and teachers with Ph.D.s. In both cases, for better for worse, the children will become literate in the basic sense of the word: they will presumably be able to decipher a text written in a language that they comprehend and will be able to formulate - in writing - a sentence of their own. Literacy has been achieved. It is what happens from this point on that will show up the most glaring differences. One student may remain on the level of third grade reading and writing. Without libraries or further education he will gradually forget what little skills were acquired and shall sink into functional illiteracy that will make him or her barely employable in the modern world. Another, given the right opportunities will strive to achieve more advanced levels of education and will eventually become computer literate, knowledgeable in languages other than his or her own and will be capable of entering into the economic circumstances of an information society. Schools in many countries around the world are enthusiastically endorsing programs to establish computer literacy. It is sometimes easier to get funds for a computer lab than for books. But computer literacy is only at the bottom of the pyramid of skills needed for information literacy. Most of our university's undergraduates may be computer literate, but they still manage to produce sheets of irrelevant or marginally appropriate computer print-outs from their searches through basic OPACs. The poorer and more backward the circumstances, therefore, in which a child grows, the more important will be the role of the library and the librarians in this process. Library services to the general public must now mean introducing the general public to an information society, e.g. to make the general public information literate.

The transformation of computer literacy into "information literacy" is to my mind the task librarians of the next decade will have to tackle. Librarianship has always meant being information literate: that is what librarians do! But at the onset of the third millennium they must not only provide information, but also become agents for the propagation of information literacy. Figuratively, they are standing between a person's needs and a machine's ability to fill these needs. In that position they must learn how to think both in the way their patrons, at whatever level of information literacy, are trying

to formulate their thoughts and to learn how to retrieve the answers as efficiently as possible for the machines serving them. These skills may be those most difficult to impart: I must confess that I find it very difficult to formulate how to create an effective human/machine interface in the form of a librarian. Unfortunately, however, that is what I feel should be done. The more sophisticated the user, the easier it is to satisfy his or her needs. Where the gap between the skills of user and the available means of filling his or her needs is at its largest, that is where the skill of the librarian must be exercised at its fullest.

Is it possible to continue creating the "librarian" as a person capable of filling all the demands of the profession? This seems to become increasingly difficult, not to say impossible. Librarians have traditionally been trained at graduate level, and rightly so: information literacy practically demands that the librarian has acquired at least the rudiments of scientifically oriented thinking. However, library schools find themselves squeezed into a sched-ule progressively insufficient for their needs. A postgraduate course in my country is a hefty twenty-six course hours during two years: a heavy study load for those already working, having families etc. Many schools demand an equally heavy schedule with additional hours for practical work or apprenticeship. Nevertheless, if the course has to take graduates of humanities and within two years make them into information experts and into skilled providers of services to the general public, the hour load would have to be doubled at least: there is just so much that can be taught within the framework of twenty-four to twenty-six week hours. We can create any number of interesting curricula, can find inspired teachers who turn unsophisticated computer novices into computer wizards in the course of a semester, we still cannot encompass all that the librarian in this period of transition needs to know within these time frames.

One possible solution is of course one taken by many library schools facing this problem: train information specialists OR librarians for the general public. To my mind this maybe expedient, but can prove ruinous as well: in those countries, where literacy, computer literacy and information literacy are at their most basic level, the librarian must be capable of filling both functions: that of an information specialist as well as change agent in a world of transition. A librarian working with Ethiopian youngsters or with kids from Kirghistan in my country needs to help make them not only literate in Hebrew, but also computer literate so that they eventually will become information literate and integrate into the economic framework of

82

their new country. In training my librarians I have to keep in mind not only the personal inclinations of the candidates, but also the needs for which I am training them: they tend to come with eyes shining in enthusiasm over information retrieval and their future working in high tech industries as information wizards. This is very good for recruiting, I have found, but what about all those school libraries with the solitary computer and one thousand books, in a country where the most effective reference material is either in English or translated. Still, we are lucky to have an enterprising and well organised publishing industry, which churns out reference works in Hebrew and Arabic in increasing numbers. But what about India, with its seventy two official languages, and what to do in Africa divided as it is not only by native languages, but also between French and English as foreign languages? What kind of curricula must we develop to cope with such circumstances? Shall we at international congresses talk about the problems of Internet, while there are countries with no libraries or librarians at all? Parts of the world where librarians still operate without electricity or typing machines? Do any of us here present even remember what a typewriter looks like? Do we still recollect the handprinted catalogue cards of the pre-LC card era? I am afraid that this is a problem that librarians around the world and conference forums must consider, if the world is to bridge between the information literate and those without its means.

I have tried to characterise the librarian of the next decade straddling the millennium divide as a "human interface between user and machine". I believe such a librarian can be created by resisting to some extent the headlong rush into an information world. I opened at a random an issue of Library Technology and these were the headlines that my eyes picked from the page:

"NEW AUTOMATIC VENDOR WITH A GLOBAL SCOPE"; "BLCMP LIBRARIES ON THE WEB"; "DATA TREK UPGRADES SCHOOL SERIES..."; "GALAXY 2000 INTERNET SERVER"; "TECHLIBPLUS OPAC FOR INTRANETS"; "UNICORN LINKS TO MULTIMEDIA..."

This is just a random sample. There is a whole new world out there among the galaxies and cyberspace. What worries me is that we may leave the earth behind in our endeavour to reach the stars.

References

1. UNESCO. *Literacy and illiteracy.* Educational studies and documents no. 42, Paris, Unesco, 1982.
    CLAIRMONT, Frederic. Reflections on technology transfer. *Droit international du developpement,* Algiers, Office des publications Universitaires, 1976.

2. U.S. National Commission on Excellence in Education. *A nation at risk.* Washington, DC., Government Printing Office, 1983. In this important survey references to libraries and librarians as partners or at least participants in the educational process was completely ignored.

3. American Library Association Presidential Committee on Information Literacy. *Final Report.* Chicago, Ill., ALA, 1989. While this document was the "official" final word on the subject, it only opened up the subject for discussion:
    ARP, Lori. Information Literacy or bibliographic Instruction: semantics or philosophy? RQ 30 : 46-49, 1990 is only one example out of many.

BIBLIOTHECA ALEXANDRINA:
Revival of the Ancient Library
of Alexandria Project

Mohsen Zahran
General Organization of the Alexandria Library (GOAL), Alexandria, Egypt

Dr. Zahran received his undergraduate education at Ain Shams University in Cairo, followed by two Masters Degrees and a Ph.D. degree in the United States. Since completing his studies he has been contributing to many international projects as an expert and consultant. He has been active in the city of Alexandria, especially as Chairman of the Urban Planning Commission of the Governorate since 1982, and responsible of the "Comprehensive Master Plan for Alexandria 2005", and Professor of Architecture and Urban Planning, Faculty of Engineering at Alexandria University (Head of the Department of Architecture since 1994). He has authored many books on architecture and urban planning, in both Arabic and English.

Abstract

The "Revival of the Ancient Library of Alexandria and the new 'Bibliotheca Alexandrina' project" gained world attention in 1987 when the Director-General of UNESCO announced an "Appeal" to all Nations, Organizations, Businesses and Individuals to support the project financially or in kind. Since that time the International Architectural Competition was held, which resulted in the choice of the best design for the building by Snøhetta a.s. (Norwegian architects); the Egyptian General Organization of the Alexandria Library in 1989; the Project Agreement between the Egyptian Government and UNESCO was signed in 1990, which created the three international bodies for

85

the execution of the project (Honorary International Commission, the International Executive Committee and the Executive Secretariat); the first International Commission was held in Aswan in February, 1990 and US$ 65 million were contributed to the project.

The Executive Secretariat began functioning in 1992 by the appointment of the Project Manager and Deputy Project Manager. The Architectural Design and Engineering Contract, as well as the Tender and Supervision Contracts were signed in 1993 and the Design Services began immediately thereafter. Many milestones have been crossed since then.

Introduction

UNESCO has been a partner and major supporter for the Bibliotheca Alexandrina project for more than 10 years, since before the former Director-General, Mr. Ahmed Mokhtar M'Bow announced the International Appeal for contributions to the library. After that in 1988 President Hosni Mubarak, in the presence of Mr. Federico Mayor, Director-General of UNESCO, laid the cornerstone for the new library. Also, the General Organization for the Alexandria Library (GOAL) was created by Presidential Decree #523/88.

In 1989 the International Architectural Competition was held with the cooperation of UNESCO and the International Union of Architects (IUA) and the financial support of United Nations Development Program (UNDP) for the selection of the best architectural design for the building. In 1990 the Honorary International Commission was held in February in Aswan for the raising of the initial funding for the construction, as well as the project agreement between the Government of Egypt and UNESCO being signed. The establishment of the Executive Secretariat of the Project was created at Shallalat Building premises in 1992 shortly after. The seat agreement between Egyptian Government and UNESCO was signed on 1-11-93 by the Director-General of UNESCO and H.E. the Minister of Education, and legalized the formal establishment between UNSEEN and the Egyptian Government and it is now fully implemented and operational.

Many milestones have been crossed since then, these may be summarized in the following topical overview, including the Director-General's renewal of the Appeal to all Nations for the Bibliotheca Alexandrina on 10-05-96.

Library Components and Functions

There are four main components of the library, plus the Conference Centre and Ancillary Services. These are the Universal Library, Cultural Activities Areas, Technical Services/Operational Support, and the International School of Information Studies (ISIS).

- The Universal Library will have about 37,230m² for the books and periodicals, special collections (manuscripts and rare books, audio-visual library, maps and music) and the young peoples' library.
- The Cultural Activities Areas will be about 4,210m² and will include the Planetarium/Science Museum (about 1,300m²), the Calligraphy Museum, the Ptolemy Hall (Hall of Fame, Alexandrina Museum), Multi-Purpose Hall, Exhibition Area, VIP Area, and Cafeteria.
- Technical Services and Operational Support will comprise about 10,860m² for the computer rooms, conservation/preservation laboratory, press, book processing, administration, and other facilities.

- The International School of Information Studies (ISIS) will be about 21,725m² and will include administration, classrooms, lecture rooms, conservation/restoration laboratory, language laboratory and meeting and staff rooms.

The attached Table of Project Components and Elements (see appendix) lists the various site information, components and library content information.

Design and Supervision Contract

Negotiations for the design and supervision contracts began after announcement of the winner of the International Architectural Competition. After 15 months, the two contracts were signed 24-10-93 by H.E. the Minister of Education, as Representative of the Egyptian Government, and Representatives of Snøhetta a.s./Hamza Associates. Since that time steady and consistent progress has been made in the project activities, with no delays either in progress of work or in payments of the contracts. The Design & Engineering Contract initiated with beginning of design work on 23-12-93 and included the deliveries of the outline design (15-02-94), the schematic design (6-07-94) and was completed 22-08-95 with the final detail design submission. Full payments for these two contracts have been by the Government of Egypt in cost sharing and have always been timely.
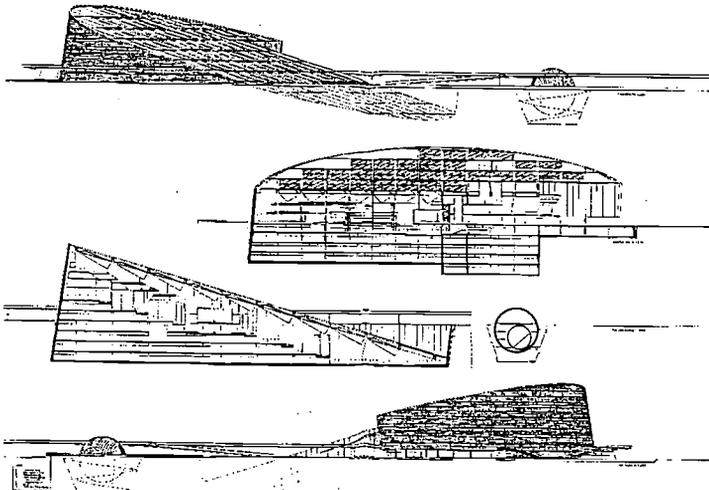
The supervision contract and beginning of the construction works were initiated with the notice-to-proceed on 15-05-95 to Rodio-Trevi-Arab Contractors Joint-Venture (RTA J-V) to begin Phase #1 construction work. It will continue for the duration of the construction works, through to 1998.

Phase #1: TP1 (Foundations and Ground Engineering)

A prequalification exercise in February 1994 for the selection of qualified tenderers ended with the selection of 34 qualified contractors for the international tender action for Phase #1 (TP1). The beginning of the tender action for phase #1 of the building construction (Foundations and Ground Engineering) and ended 6-02-95 with the selection of the best contractor, the Rodio-Trevi-Arab Contractors Joint-Venture (RTA). Also in that time the tender contract was initiated 20-10-94 for the tender evaluation. After the selection of the best contractor, a contract was signed by H.E. the Minister of Education, as representative of the Government of Egypt, and representatives of the RTA on 29-04-95. A Notice to Proceed was issued by the Resident Engineer (Representative of the Consortium) on 15-05-95. To date, the work is nearly completed, which amounts to nearly 25% of the total construction operations. The design is an engineering milestone in
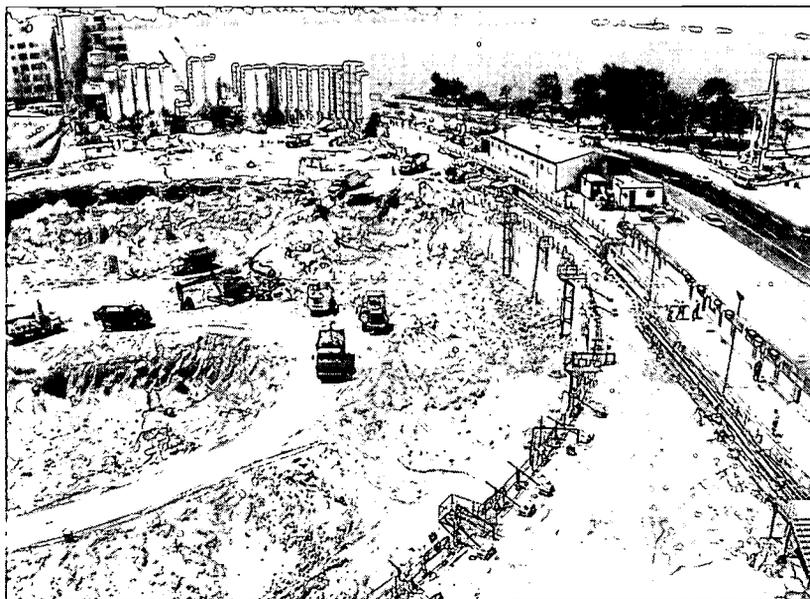
that it features the largest insulated diaphragm wall in the world, which was constructed with a diameter of 160 m. This work was completed 3-07-96, as well as the jet grouting, done to consolidate the ground soil, especially around the existing buildings. The piling work is now going on and is expected to be finished in mid-July 1996.

After verifying soil investigation results, the Resident Engineer issued a major variation order for TP1 for the elimination of the Horizontal Grout Blanket item to be replaced by a raft-slab of insulated reinforced concrete. This will result in a saving of about US$ 8 million. The raft-slab was originally to be part of TP2 (Phase #2) but has been appropriately moved to TP1. This will also result in saving by decreasing the time needed for TP2, by the fact that the contractor for Phase #2 will be able to mobilize during the construction of the raft-slab and completion of Phase #1. All construction work is expected to be completed by the end of 1998.

Phase #2: TP2 (Structure, Finishing, Fit-Out, and Services)

A prequalification exercise with 26 interested international contractors was also held for selecting the best contractors to participate in the international tender action for TP2 (Structure, Fit-Out, Finishing and Services). The Tender Submission was 29-05-96, and a decision making committee, appointed by H.E. the Minister of Education, Chairman of the IEC, began evaluation of the bids to select the best contractor for the Phase #2 works. At the present time, preliminary negotiations are underway with the first selected best tenderer. The final announcement of the decision is expected in September, 1996.

The Phase #2 contract is scheduled to last 900 days, with a great savings of time expected by the overlap of work with Phase #1. Phase #2 should be completed by the end of 1998, in time for the inauguration of the Library by President Hosni Mubarak.

Library Services

Work on library services is proceeding in several main areas:

1. Training of the librarians, intellectual contents and acquisitions, including the two international symposia, archiving, storage, conservation/ restoration, depository library.
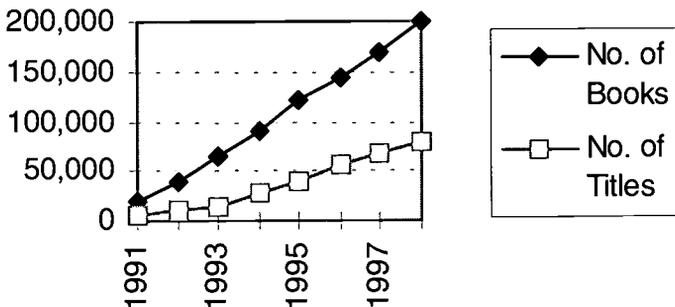
2. The information systems to be used in the library.

3. The library organization in both form, content and procedures.

4. International School of Information Studies (ISIS).

5. Complementary facilities are to be studied (Planetarium/Science Museum, Hall of Fame, Museum of Alexandria).

Training of the librarians has been going on since 1990, both by in-house experts, seminars and courses, as well as scholarships for librarians to train abroad (especially to France). We are using the CDS-ISIS as a base for our own bibliographic format and a manual of bibliographic format was published in English and Arabic by the Executive Secretariat staff in 1995. This has been reviewed by experts, and it will be integrated with the new information system to be established with the library. It is foreseen to have wide application in Egypt and the region.

Two very successful international symposia have been held, in 1994 and 1995, resulting in the refining of the collection development policy, along with the gift and donations policy, and many significant recommendations to guide the project to completion.

Acquisitions for the library have been going on since 1990 through the GOAL budget, at about 30,000 per year, resulting in about 120,000 volumes to date. These have been catalogued and stored appropriately. In 1997, we expect to begin the final processing of the books.

Progress of Book Acquisition

A preliminary study has been made for the information system for the Library. This system is projected to cost US$ 9-10 million. The Government of France is seriously considering to provide the funding for the information system. UNESCO has installed a "homepage" for the "virtual" Bibliotheca Alexandrina. We foresee to begin to use the Internet to provide a regular service in the near future.
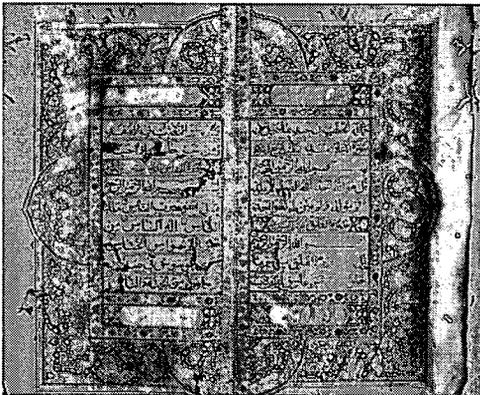
The Conservation/Preservation Laboratory is partially equipped and established at the Executive Secretariat Headquarters. At this time the UNESCO Purchasing Department is in the process of purchasing equipment for a microfilm laboratory, a digitalization laboratory, and a chemical laboratory to be used in conj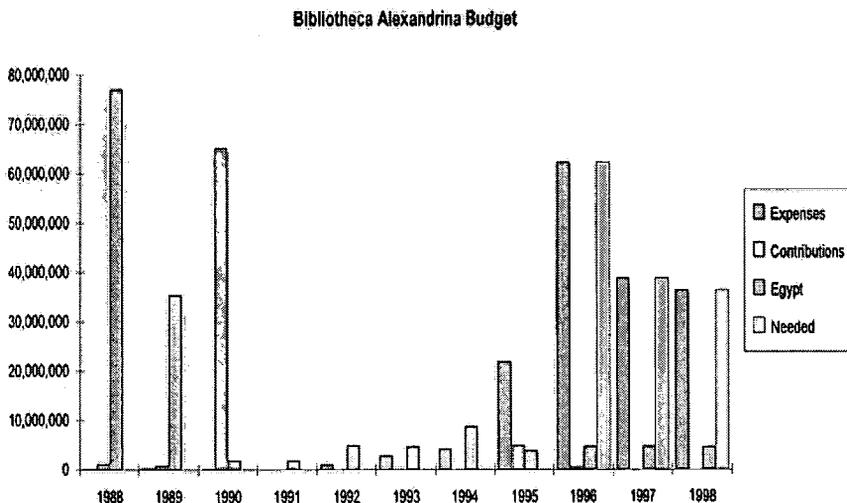unction with the conservation/preservation laboratory. The staff have undergone various training measures by international experts from France, Norway and Turkey, and are now working on selected manuscripts from the Alexandria Municipal Library. This collection is being catalogued by our librarians and many beautiful and rare manuscripts have been located. You can see some examples of these manuscripts in our first Bibliotheca Alexandrina publication, *Rare Manuscripts*. We are now also working on cataloguing another library in Alexandria, that of the historic Mosque of Sidi Abu El Abass Al Mursi.

Furnishing of the front-areas of the library have been designed by Snøhetta a.s. and are being built under a grant from the Government of Norway. The preliminary meeting for the design of these furnishings and the building layout was held on 17 April 1996, and a tender for the manufacturing is now in process.

The remaining services and components of the library, such as the Planetarium/Science Museum, Hall of Fame, Calligraphy Museum, Alexandria Museum, are in the planning stages. Several suppliers have made proposals for the Planetarium/Science Museum and are trying also to provide the financial support for them, in the range of US$ 3 million. We

are identifying personalities to be noted in the Hall of Fame, and making initial layouts for the area, as well as the Alexandria Museum which will house the artifacts found by the antiquity excavations at the site. Proposals are also being developed for the Calligraphy Museum at this time.

Contributions to the Project

Bibliotheca Alexandrina Budget

ST COPY AVAILABLE 93

Contributions to the Project

Egypt	• GOAL budget (US$ 24,000,000)
	• Design and Supervision Contracts (~US$ 13 million)
	• Site (now valued at US$ 177 million)
	• Conference Centre (now valued at US$ 35.4 million)
UNESCO (Voluntary Contributions)	Project 416/EGY/84 (VC) ~US$ 70,000 Initial Feasibility Studies
UNDP	US$ 1,300,000 (Project EGY/88/003)
International Commission: Saudi Arabia, United Arab Emirates, Iraq, Oman	US$ 65,000,000 for the building construction
Government of Norway	• ~US$ 5,000,000 (NoK 30 million) for Front-Area Furnishings
	• US$ 2,800,000 to Snøhetta a.s.
	• Video of the library maquette
Government of Italy	~US$ 400,000 for the Conservation/ Preservation Laboratory through UNESCO FIT project 534/EGY/80
Embassy of Japan in Egypt	US$ 500,000 (JY 50 million) Cultural Grant for technical equipment
Government of France	• Book and Manuscripts
	• Scholarships and training
	• Consultants
British Council	£ 20,000 for User Needs
Mexico, University of Colima	53 CD-ROMs (equivalent to about 150,000 books)

94

Bibliotheca Alexandrina
Project Components & Elements

INFORMATION ON THE SITE & THE BUILDING

Total Site Area	40,000 m²
Diameter of circular structure	160 m
Building height	30 m
Building depth below ground level	11 m
Number of floors	10
Built-up area coefficient	77%
Floor area ratio	2.13
Total cost estimate	US$ 170,000,000

FUNCTIONAL COMPONENTS OF THE LIBRARY

Universal Library   37,230 m²
    Including: Books & Periodicals, Special Collections
    (Manuscripts and Rare Books, A-V Library, Maps,
    Music), Young Peoples' Library

Cultural Activities   4,210 m²
    Science Museum/Planetarium (1,300 m²)
    Calligraphy Museum (250 m²)
    Ptolemy Hall (Hall of Fame, Alexandria Museum - 550 m²)
    Multi-Purpose Hall, Exhibition Area, VIPs, Cafeteria (4,210 m²)

Technical Services/Operational Support(Computer rooms,   10,860 m²
    Conservation/Preservation Laboratory, Press, Book
    processing, etc.)
    Other Facilities (Administration, other Activities)

International School of Information Studies (ISIS)   725 m²

Total Area of Project Components   56,405 m²

Conference Centre & Ancillary Services   21,840 m²

95

LIBRARY CONTENTS

Books	200,000/8 million
Periodicals	1,500/4,000
CD-ROM disks	200/1,000
Audio Materials	5,000/200,000 Discs/cassettes/tapes
Audio-Visual Materials	10,000/50,000 Slides/tapes/videos
Manuscripts & Rare Books	10,000/50,000 Manuscripts
Maps	50,000 Maps
Computer Data Bases	OPAC, Subjects
Internet Access	To the World

LIBRARY STAFF

International School of Information Studies (ISIS)	28
Technical & Professional Staff of the International Library	400
Technical & Professional Staff of the Printing Press	100
Conference Centre Management	50
TOTAL	578

96

Navigating Permanent "Whitewater" of Organizational Change

Richard M. Dougherty

School of Information, University of Michigan, Ann Arbor, Michigan, USA

Richard M. Dougherty served as University Librarian at the University of California, Berkeley from 1972-78, and Director of Libraries at the University of Michigan from 1978-88. He was elected president of the American Library Association in 1990. He founded Mountainside Publishing in 1974 and has edited both College and Research Libraries and the Journal of Academic Librarianship. He is currently a professor in the School of Information at the University of Michigan, editor of Library Issues, and President of Dougherty and Associates, a consulting firm that specializes in organizational development and change management for libraries.

Abstract

Change in today's organizations is not only constant but often turbulent. In libraries it is safe to say that the jobs of all employees will be affected in the days ahead. This likelihood has enormous implications for all campus libraries. This paper explores the nature and types of change, and presents a realistic change model. Finally, change strategies are linked with planning strategies.

Introduction

Organizational change is no stranger to this group. Most of us devote much of our workday initiating or responding to changes in our environments and organizations. Our staffs operate under enormous stress; many fail to

97

appreciate how much change they have accomplished under difficult circumstances. One way to make this point is to ask: "What are some things you are doing today that you take for granted, that you didn't or couldn't do ten years ago?" The responses will invariably include use of online catalogs, fax, e-mail, personal computers, pagers, the Internet and the Web. The list goes on and on. Staff are actually surprised when it dawns on them how much they have actually accomplished. In an organizational context, many libraries have done more than simply survive, they have thrived. This is quite remarkable in light of the number of times we have been told by officials and technologists that the death of libraries is eminent.

There is no question but that all organizations are searching for ways to prepare themselves for the 21st century. Reinventing, reengineering, process engineering, benchmarking, TQM programs, strategic planning, etc. are the buzz-words of the nineties. All reflect strategies that are being applied to facilitate organizational change.

Corporations such as IBM, Ford Motor Company, Motorola have all embarked on ambitious programs of change in order to stay competitive or to improve their competitive advantage. AT&T has virtually transformed itself since the company was broken up over a decade ago by the American courts. We are beginning to witness similar transformational activity in the telecommunications industry as the giants of the industry jockey for position.

It is important to keep in mind that organizational changes in corporations, and even in libraries, now transcend national boundaries. Change has become global in the same sense that national economies have become global.

Universities and the Changing Environment

Change in universities has not been nearly as dramatic as in the corporate sector. Of course, there has been plenty of change, but if one looks closely enough, the likely conclusion is that most universities have remained pretty much the same. And while technological tools have become ubiquitous on campuses, the experiences of most students and faculty haven't yet been changed markedly.

There are many causes for this seeming failure to act. In the United States, the reasons are pretty well known. For example:

- Campus visions of the future aren't truly shared visions; faculty aren't excited by the vision and thus, aren't willing to commit to their achievement;
- Faculty are often focused on their own work and don't see the need for change in *their* department or university;
- Job security and tenure policies obviate the need to undertake changes that are viewed as undesirable, e.g. using information technology in the classroom.

There are other explanations for the absence of change, but the above factors have certainly played their part as inhibitors.

I readily admit that the scenario I've painted largely refers to the United States. The experiences have been quite different in countries where direct governmental budget intervention has occurred. Just north of our border Canadian librarians have had to deal with significant budget cuts for several years. This period of austerity is leading to new library structures for organizing and delivering services.[1]

Our British colleagues who were forced to implement programs of change due to the budget cuts mandated during the Thatcher years certainly know about the pain of change. Or in South Africa, where universities are feeling the squeeze of budget cuts as the Mandela government pursues an aggressive program of reallocating resources to implement social programs in order to retain social stability. In all of these cases, change was unavoidable.

While most institutions of higher education in the U.S. have not yet reached the point where change is unavoidable, I still feel there is no justification for feeling complacent about the future health of higher education. Academics in U.S. colleges and universities would be well advised to shake off the organizational lethargy that currently prevails and initiate actions that are long overdue, and which are needed to ensure the long-term viability of their institutions. Leadership is desperately needed.

Gerhard Casper, the president of Stanford University, recently urged a group of higher education leaders to prepare their institutions for high-tech competitors of the future by defining their institutions' value to society. He predicted "...distance-learning technologies [will] have 'a profound im-

pact' on universities as they blur the lines between high school, college, and advanced degrees and enhance the shift to life-long learning."[2]

But as previously noted, the need, or possibly the will to change is not yet evident at most U. S. universities. It is probably fair to ask: can we realistically expect transformational change in colleges and universities? I'd like to think the answer is yes, but I don't believe that is a realistic expectation. Universities are segmented organizations. Individual units rarely share common visions; in fact, the visions of individual units are often in conflict with the aspirations of other units. At present it is easier for an individual unit to transform itself than it is for the institution itself. Because change in universities is so difficult, I believe that universities will increasingly find themselves in competition with "new types" of educational agencies. For example, corporations will become more proactive as educational agencies because of their need for trained workers; technical and vocational schools will serve high school students who seek to learn vocational skills, and adults who find it necessary to change careers; and distance learning programs will educate students or prepare them for the workplace. Such programs already dot the landscape. Developments in multimedia and telecommunications assure us that the quality and cost effectiveness of distance education programs will gradually become more competitive with the traditional approaches.

I'm not suggesting that universities will disappear, but I believe their ability to compete for students will decline and thus the economical viability of some institutions will be sorely tested. In fact, if the external threats posed by economic constraints and technology continue to intensify, some institutions, particularly those in the United States, where education is no longer heavily subsidized by government, may be forced to abandon programs and lay off faculty. Some private schools may even go bankrupt. Hopefully, before these trends become irreversible, influential academics will start to view programs of change with greater receptivity.

Transformational Change

Many change management gurus talk about the need for transformational change. They believe that the traditional strategy of introducing changes in an incremental fashion will not produce the degree of change that is needed to ensure success in the 21st century.

Joel Barker, who is probably the first person to use the term "paradigm shift" to describe transformation change in organizations, stresses the need for an organization to have a vision of where it wants to go. The vision must be exciting and stretch the organization. While he believes that a vision ought to originate with management, he also stresses the need for staff support for the vision.[3]

Michael Hammer and James Champy, also organizational experts, urge organizations to reinvent themselves. They argue "...corporations must undertake nothing less than a radical reinvention of how they do their work...and while that sounds extreme there is little alternative to radical action if a company wishes to keep its door open in the 21st century."[4]

Stan Davis is more specific in his vision of what 21st century organizations must do to be successful. He believes they must exhibit the capacity to provide services, at any place and any time, and they must be able to tailor their products and services to meet the needs of each customer.[5] The common thread running through all of these messages is that organizations must change radically if they are to succeed in the next century.

Change and Libraries

The need for change probably seems more clearcut in the private sector as markets become global and companies race to introduce new products to the market. But how urgent is the need for change in libraries? Carla Stoffle and her colleagues at the University of Arizona believe it is essential. In a recent paper, they challenged academic librarians to adopt drastic new approaches to organizing libraries. To achieve their vision, libraries will have to reengineer the way they are organized, services are delivered, and how they are governed.[6]

While I philosophically agree with Stoffle, I'm not optimistic that we can expect change in libraries to occur more rapidly or be more startling than occurs in our parent institutions. We must remember that libraries cannot act as free agents; they are integral parts of larger communities. They share deeply rooted campus cultures and traditions. In my opinion, change is more likely to be incremental than transformational.

In the shorter term, if transformational change isn't likely to transpire, what can we expect? Let's explore this question from the perspective of libraries. There are a variety of change strategies an organization can pursue. Let's explore this question from the perspective of libraries. Hickman identifies

101

a continuum of strategies beginning with the classical continuous improvement method, i.e., incremental change to revolutionary approaches such as those suggested by Hammer and Champy. Hickman also identifies other strategies including synthesis of best industry practices, focusing on and empowering teams and reengineering work processes.[7] My work with organizations convinces me that the most commonly used strategy in libraries is a top-down, incremental approach, but with a growing tendency to empower staff groups through teams. A few libraries are also taking more seriously the need to reengineer work processes.

The strategy a library selects to plan and implement change is essential. The time when a library director assisted by his/her administrative associates, even with participation of selected staff, can create a plan and expect staff simply to follow directions and implement whatever changes are proposed, is no longer an effective strategy for introducing and implementing change.

While I'm not sure top-down directives were ever as effective as we thought they were, we have to acknowledge that a great deal of change has occurred in recent years, regardless of the process used. But the old processes are becoming less effective because organizational environments are less stable and the time frames in which change must occur are also much shorter. Peter Vaill characterizes organizations as navigating in permanent "whitewater". Unfortunately, as Vaill points out, traditional organizations more nearly resemble flat-bottomed houseboats than the kayaks that are needed to negotiate whitewater.

The need for flexibility raises serious questions, at least in my mind, regarding the efficacy of traditional strategic planning processes. One should be wary of processes that are slow and which stretch out a change process. Processes that are more powerful are needed for this era of constant and turbulent change. An organization needs to be nimble and take advantage of windows of opportunity when they occur. An organization must never feel that it is bound by "the plan". A formal strategic document is likely to be outdated before the written copies are distributed. Organizations need a process that is flexible and facilitates forward movement quickly.[8]

I learned an important lesson about the need for flexibility back in 1984. We were in the initial stages of implementing a strategic plan that had been largely a staff-driven process. But when a computer hardware company unexpectedly offered to cut a deal that would enable us to purchase 75 PCs

with software packages that included spreadsheet, word processing and communications capabilities, the deal seemed irresistible and we jumped at it.

I was really excited because this was a real campus coup for the library. We would be able to tie all units together, regardless of their geographical location on campus into a single, cohesive network. This network would change the way we communicated in the library and the way we conducted our affairs.

I assumed that others would feel the same way, and while most staff were also pleased, there were also a number of staff members who objected, pointing out that there was nothing in our strategic plan about the acquisition of computers. Why hadn't I consulted them before making such a decision? They had a point, but the window of opportunity didn't permit time for a formal staff review. It was clear that we had become too bound by our "plan". We needed greater flexibility. Today a planning process must be flexible and malleable or the plan itself is likely to become an obstacle to change rather than a road map for change.

Change Models

The literature of change management is full of change models. One traditional model was articulated by Kurt Lewin. He believed that one prepared an organization for change, made the change, and once the change was completed, return the organization to a business-as-usual mode of operation. He called this unfreezing, making the change, and refreezing the organization. In such an environment, staff could realistically expect that once a change was implemented, they could expect a return to their regular duties.

This expectation is no longer realistic because change has become continuous. Unfortunately most libraries don't seem to understand the implications of continuous change, and their failure to adjust to this new environment often produces even greater-than-normal levels of stress and frustration among staff. So long as staff are expected to perform regular duties *in addition* to implementing new procedures, staff will be stressed and many eventually will begin to feel they are on a perpetual treadmill. Most people recognize that the traditional Lewin change model no longer works. Change is now continuous. There never seems to be a let-up. We need new models and new strategies.

103

A change model I've found very helpful in explaining the conditions that must be present in order for change to occur is based on the work of Richard Beckhard and Rueben Harris.[9] They present a change model that can be expressed in terms of a simple equation: $D \times V \times F > R$. The "D" stands for dissatisfaction, the "V" for vision, and the "F" for first steps. If these three factors working in combination are present, and if the overall impact is great enough to overcome "R" resistance, change (C) will occur. I'd like to restate the equation in slightly different terms; that is $C = D \times V \times F > R$. For change to occur, the D, V, and F are conditions that must be present and greater than R.

Let's explore the various components of the equation in a little more detail. The "D" stands for dissatisfaction. This means that before change is likely to occur, dissatisfaction must exist. People must be feeling "pain". They must be sufficiently dissatisfied with the current situation that they are willing to endure the pain of change. It is the lack of pain or dissatisfaction that largely explains why librarians have been slow to embrace the need for change.

It is also important to emphasize that dissatisfaction need not be negative in nature. A visionary leader might be dissatisfied with the current situation and wish to see change occur. Of course, the principal challenge to such leaders is that they build a base of support for their vision. In university settings this has proved to be a daunting challenge because visions are so rarely shared visions.

Ideally, it would be great if change were always triggered by inspiring visions, but researchers tell us that in most organizational situations, change doesn't derive from inspiration, it derives from organizational pain. For example, the Ford Motor Co. didn't initiate its change program, Quality is No. 1, until its U.S. car division was hemorrhaging $1 million per day. IBM was also slow to react to the changing technological marketplace until it was almost too late. Even then IBM was forced to jettison its corporate culture of no layoffs as thousands of IBMers were forced into early retirement or given lay off notices. I wouldn't be surprised if universities fail to act until they are faced with the unavoidable need to institute program cutbacks and lay off tenured faculty.

The Vision component (V) of the equation states that every organization needs a vision. It needs to know where it is headed. There is an old saying: "If you don't know where you are headed, any road will get you there." An

organization without a vision is likely to be an organization that has lost its way.

It is also important to remember that organizational visions are not static; they need to be revisited periodically as conditions change. Librarians who tell me they don't need to engage in a visioning process because they created a vision statement last year don't seem to understand the difference between mission and vision statement. Unlike mission statements, which are customarily stable, visions are dynamic and need to be much more dynamic.

The First Steps (F) refers to the need to create action plans that will lead to concrete milestones of progress. Too often librarians have created wonderful visions of what professionals will be able to do in the future. But unless the visions also include first steps that demonstrate concrete progress, staff will gradually lose interest because the visions lose their immediacy and relevance.

If all of the above conditions are present in an organization, momentum capable of overcoming (R) resistance is possible and thus change becomes much more likely. Since resistance to change is inevitable and since resistance is often a healthy and desirable reaction, I recommend not thinking about "overcoming" resistance but learning how to "manage" resistance in a change process.

Change Strategies

There are a number of common approaches to introducing organizational · change. These include top-down, bottom-up, cross-section and pilot projects.

Top-down describes a situation where an organization's leadership team decides which changes will be made. Communication with staff usually occurs through a combination of large group briefing sessions, briefing documents, memoranda, etc. When this approach is used, researchers tell us that many staff will not really understand why the changes are necessary. They also won't feel any sense of ownership. I suspect, however, the top-down approach is still the most prevalent change strategy employed by libraries, particularly when it is augmented by staff implementation teams.

Bottom-up strategies usually involve a team approach. This strategy gained popularity during the empowerment movement of the 1980s. This

approach can be effective but too often the various teams begin to work independently, focusing on the issues that are most pressing from their individual group perspectives. The larger view of organizational change gets lost in the process. It is also the case that progress is likely to vary from group to group, so that the overall organizational objectives are not achieved as some of the small groups succeed whereas others falter.

Cross-section strategies usually involve recruiting a representative group of staff from a cross-section of the organization. The representatives are formed into group(s) variously known as taskforces, working groups or something similar. The taskforce members are able to gain a broad understanding of the proposed changes because they are actually involved in the change process. Others in the organization, unfortunately, may never be meaningfully involved in the process. They don't understand the changes themselves or why they are needed. As a result, ownership of and commitment toward the changes are generally lacking.

Pilot strategies can be used to demonstrate the potential of a change, i.e., pick a group to show others what is possible. The usual approach is to select a particular part of the organization or a particular set of activities that will highlight the change process. These change efforts are usually well defined and since management has a stake in their success, they are generally well supported. The results of the pilot, assuming that it is successful, will be showcased throughout the organization. Transferring the results of a pilot project, however, to the other parts of an organization can often prove difficult. The "not invented here" syndrome can get in the way and some of the so-called "resisters" will argue that they could have done it better if only they had been given the chance.

Participatory Strategic Planning

In a real situation it is likely that elements of all of the above strategies can be identified as playing a role in the change process of a complex organization. The strategy I personally prefer is called "participatory strategic planning" by its developers. It is a process based upon the work of Ron Lippitt and his associates.[10] The process they created is called "preferred futuring". Preferred futuring is unique in a number of ways:[11]

1. It is a large group intervention technique. It can be used with groups as large as several hundred people all working together in a single conference.

2. It is designed to involve the entire staff from the director or CEO to the most junior professional to the clerk in the mailroom.

3. It is a process that enables staff to be involved in both the planning and implementation phases. When staff are implementing plans they had a hand in making, it is lot easier to establish buy-in.

4. The process makes it easy to involve stakeholders. There are opportunities to hear what "customers" have to say about services. The process also enables customers to hear what staff have to say. Such exchanges of views are extremely important in this era of collaboration.

5. Change can occur in a number of different parts of the organization simultaneously.

6. The process helps to change staff perceptions about change itself. Instead of change being viewed as an add-on activity, people begin to realize that change activities must be viewed as part of their regular assignment.

Real time strategic change processes have been used successfully in dozens of organizations: centralized and decentralized corporations, state agencies, and educational organizations including libraries. A real time approach to change management is a powerful process that can generate a high level of staff support and commitment, but it is not an organizational panacea. Leadership and effective communications are still critical to the process. John Kotter identifies ten reasons why transformational programs of change can fail. Among those he cites are:

1. failure to create a sense of urgency for change;
2. lack of a clear vision;
3. not removing the obstacles to change; and
4. failure to anchor changes into the organization's culture.[12]

In my experience, most failures can be traced to a failure of management to follow through with their commitments to implement plans. What happens is that management allows itself to become distracted by day-to-day pressures, and as a consequence, loses sight of the big picture. Staff soon lose heart and before long the staff have fallen back into old habits and nothing happens. Unfortunately, when this occurs it increases staff cynicism toward change and their role in making change happen. My advice to librarians is never engage in a real time change process if a commitment to follow through doesn't exist.

107

When I came into the profession, the priority concerns were building collections and new facilities. Our organizations were pretty stable. Even the age of automation with its new systems and procedures didn't immediately lead to significant changes in organizational structures. It wasn't until integrated systems, OPACs and networks became the profession's tools for doing business that we began to see significant changes occur in libraries. We now frequently read about the flattening of organizations, blurring of lines between technical and public services, reengineering of reference, and outsourcing of functions. In those early years, leadership was often equated with those who built the largest collections and grandest buildings or implemented the most extensive automated systems. Today's leadership is often equated with technology, but it is my firm belief that the most successful leaders of the next ten years will be those who are most successful at leading their organizations through the "permanent whitewater" that lies ahead.

References

1. BECKMAN, Margaret and BLACK, John. *The Local Academic Library Within the Worldwide Context : Changes, Directions, Realities.* In: *Towards a Worldwide Library: A Ten Year Forecast. Proceedings of the 19th International Essen Symposium, 23 - 26 September 1996.* Essen, Universitätsbibliothek Essen, 1997, pp. 78- 87.

2. Colleges Face Competition in High-Tech Era. *Chronicle of Higher Education,* (April 18, 1995): A50.

3. The term derives from the work of Thomas J. Kuhn who wrote about the nature of scientific advancements.

4. HAMMER, Michael and CHAMPY, James. *Reengineering the Corporation.* New York, Harper Business, 1993. p. v.

5. DAVIS, Stan. *Future Perfect,* 10th anniversary ed. Reading, MA: Addison-Wesley, 1996. 255p.

6. STOFFLE, Carla, J., RENAUD, Robert and VELDOF, Jerilyn, R. Choosing Our Futures. *College and Research Libraries,* 57, (3), 1996. p. 213-25.

7. HICKMAN, Craig. *The Organization Game: an Interactive Business Game Where You Make or Break the Company.* Englewood Cliffs, N.J., Prentice Hall, 1994. p. 8-10.

8. Some organizations are required to produce a strategic planning document; they are not given a choice. In such instances the document serves as a political instrument which is an important purpose. My advice, when this occurs, is to separate the planning document from the change process itself. This can be done by identifying and prioritizing a set of what I term "strategic initiatives" that move the library in the direction it wishes to head.

9. BECKHARD, Richard and HARRIS, Reuben. *Organizational Transitions: Managing Complex Change.* 2nd ed. Reading, MA: Addison-Wesley, 1987.

10. LIPPITT, Ronald. Future before you plan. In: RITVO, R. A. and SARGENT, A. G., eds. *The NTL Managers Handbook.* Arlington, VA: NTL Institute, 1983.

11. This change strategy is reported on in great detail by Robert W. Jacobs in his *Real Time Strategic Change,* San Francisco, Berrett-Koehler, 1994. The process "Real Time Change Strategy" was developed by the Dannemiller Tyson consulting group in Ann Arbor, Michigan.

12. KOTTER, John. Leading change: why transformational efforts fail. *Harvard Business Review,* (March-April 1995): 59-67.

109

Creating Change without Chaos: Preparing Libraries for the 21st Century

Sheila Corrall
University of Reading, Reading, United Kingdom

Sheila Corrall was appointed University Librarian at Reading in 1995. She was previously Director of Library & Information Services at Aston University in Birmingham, and before that worked for the British Library and in the public library sector. Currently she is chair of the UK Office for Library and Information Networking Advisory Committee, the BUBL Steering Group and the Ariadne Project Board, as well as serving on the British Council Libraries and Information Advisory Committee and the Executive Board of SCONUL. She has lectured and published widely on professional and management topics. Her particular areas of interest include service quality, the management of change and the development of the electronic library.

Abstract

Library planning and management must change significantly if services are to survive and thrive in the future. Current issues and pressures present complex challenges for managers, including the difficulties of coping with the economic and electronic imperatives, and judging the pace of change. We need a strategic management framework to transform our visionary dreams into concrete actions. This means thinking strategically, involving stakeholders and planning with partners to develop services tailored to customer priorities.

At a practical level one of the hardest tasks is to manage time and priorities, to strike the right balance between maintaining existing

service to an acceptable standard and working on improvements for the future. The world of business offers models, tool and techniques which can usefully be adopted and adapted by library managers. Strategic planning and total quality management require a long-term commitment to getting things right, but it is also important to find ways of showing quick visible results to impress paymasters and motivate staff. The focus of staff training will shift from specifying and testing job-related skills and competencies to developing capabilities and managing talent. Organisational structures will follow some general trends, but must be designed to suit individual institutions at their particular stage of development. Structures need to be fit for their purpose and fluid to enable progress.

Communication is the key to success in the change process and must be managed actively. Effective library managers will be leaders with vision, people who are flexible and listen to the views of others, but who are also decisive and prepared to take responsibility for change.

Preparing Libraries for the 21st Century

Library planning and management must change significantly if library services are to survive and thrive in the future. Current issues and pressures present complex challenges for library managers. The environmental factors that are forcing change are well known and have been extensively documented (for example, in previous papers at this symposium). It is convenient to categorise these change drivers and consider them under four headings or perspectives - technology, economics, politics and socio-demographic aspects. I have used this framework in the past - notably in an article on libraries in the information society in *New Library World*[1] - and while it is still valid as a starting-point, what is more important now is to consider how these variables are interacting, and assess their combined effects on library and information services in the present and future.

Advances in technology offer more options for delivering and managing services differently and better than before, but the publicity and excitement generated by Internet developments has raised the expectations and demands of our users and funders to an unprecedented level. Add to this the continuing downward trends in budgets generally, the upward spiral-

111

ling of publication prices, the unpredictability of IT investment, the deter-
mination of public and private sector bodies to reduce operating costs and
cut out 'non-core' activities and the massive shifts - indeed transformations
- in society at large, and we start to see the scale and complexity of the
challenge.

We are working in *a challenging environment.* Customisation and imme-
diate desktop delivery is the expectation of a society seduced by the hype
of the Internet - people want instant access to information, tailored to their
personal needs. Low-budget and cost-conscious operations are demanded
by purseholders, but with an assumption of continuous quality improve-
ment of the products and services offered. We are encouraged to "think
strategically", often required to specify strategic objectives, development
strategies, etc., but there is no time for formal planning processes - no
questions allowed, as bosses demand instant answers. The service devel-
opment, which is generally desired by both library staff and users, inevi-
tably has to be managed alongside, and in addition to, existing services -
both groups are notoriously reluctant to allow withdrawal or cessation of
activities to facilitate growth or diversification. Convergence of technolo-
gies has affected the management of operations and services, resulting in
blurring of boundaries and confusion of roles: subscription agents have
become information providers; libraries and IT/media departments are
regrouping and jostling for positions. Professional competencies are under
scrutiny: information professionals don't know whether they are about to
take over the world - or be made redundant!

Meeting the Challenge of Change

The challenge for managers includes the difficulties of coping with the
economic and electronic imperatives and judging the pace of change. We
need a strategic management framework to transform our visionary
dreams into concrete actions. I see this in the following terms: to survive and
thrive in the future, we must have a *"fast-track"* process for articulating
strategy and a *developmental* approach to operations management. The
traditional (lengthy) strategic planning exercises of the 1970s and 1980s
will not work in the current environment. Tactical and operational planning
to translate strategies into action programmes also needs attention; all too
often we hear sorry stories of strategic change initiatives that failed to
deliver, and the disappointment and cynicism engendered as a result.

Getting the best out of people is vital in a climate of downsizing and delayering, and we shall have to think more about designing *roles for individuals*, rather than describing jobs and specifying skills required. Managers must have the insight and mentoring capacity to spot - and manage - talent and build *capability* among existing staff, and this in turn requires a more flexible view of organisational structures. Structures will follow general trends (for example, cross-functional and self-managing teams) but must be designed to suit individual institutions at their particular stage of development; they will need to be *adaptive* and *fluid* to support fulfilment of changing strategic priorities and to reflect the strengths and styles of individuals and institutions. While far-sighted vision and long-term commitment are desirable aspects, it is essential to find ways of achieving *quick, visible results* to impress funders, motivate staff and (naturally) delight the customers. *Communication, confidence,* and *creativity* are the keys to success in the change process. These are all important issues, but I shall concentrate in this paper on developing our planning processes, at both strategic and operational levels, and facilitating organisational change.

A Fast-Track Strategic Management Framework

While 'strategy' has become one of the most over-worked words in the management vocabulary of the 1990s, 'planning' has gone out of fashion. Management gurus such as Tom Peters have told us to burn our plans and scrap our strategic planning processes. Henry Mintzberg has devoted a whole book to the shortcomings of long-range planning, referring to a "calculating style of management" which places too much reliance on so-called 'hard data' that takes so long to harden that the information becomes irrelevant.[2] As I have argued before (for example, in an article on 'planning for a better future' in *The Law Librarian*[3]) it is during turbulent times that people in organisations derive most benefit from having a shared view of their overall aims and constraints, as this enables day-to-day planning and decisions to respond to unforeseen issues more flexibly and quickly at the customer interface. The models and matrices, tools and techniques of strategic management and marketing, as used in the business world, can be adopted and adapted by library managers - and many have done so successfully.[4]

In this context, I define strategic planning as "the continuous development of objectives and action programmes through a devolved interactive process". The process involves:

- *scanning widely* - keeping a watch on trends and developments, externally and internally, and assessing their implications;

- *integrating projects* - combining people from different disciplines and departments, from within and outside the library, to solve problems or develop products/services;

- *involving stakeholders* - inviting input to plans from all those with an actual or potential interest in the library, including funders, customers, suppliers, external and internal partners, and of course library staff;

- *managing expectations* - raising awareness of the key opinion formers (KOFs) among these groups of the resource implications of proposals;

- *transferring learning* - using past experience, failures and successes, including peer comparisons, to inform future plans;

- *adjusting resources* - having systems and procedures to prompt and permit movement of funds and staff as required.

As already indicated, one of our primary aims must be to achieve quick flexible responses to customer needs through delegated decision-making. Doing this, we can not only tap the often wasted expertise of front-line staff, and 'empower' them in the process, but also liberate the top team by releasing senior management time for areas frequently neglected - such as communication and coaching. This should increase satisfaction for everyone.

The *context* for strategic planning today is very much one of 'planning-in-a-hurry', with inherent tensions between the pressure from institutional top management to produce results quickly and a desire of the library managers for participation and commitment from all concerned.

The *content* of planning discussions must focus now on a reduced subset of core elements requiring more discipline, insight and intelligence than has historically characterised library planning exercises - where the wish to involve, develop and encourage people has often resulted in debates on unimportant details and long lists of unrealisable projects. The essentials are:

- *planning assumptions* - based on an informed assessment of environmental forces and market trends;

- the *mission* - a statement of your purpose and functions (why you exist, what you do, whose needs you meet);

- a *vision* of where you want to be in five to ten years time, the desired future state of information services in your organisation - which may not take the form of a traditional library;

- *'strategic thrusts'* - the prime areas for investment of resource (time, money, effort), probably no more than three to five;

- *performance measures* - related to the above, and ideally no more than a handful of key indicators enabling you to track progress and success;

- *financial projections* - at the very least some commentary on resource implications of the proposed strategy. It is surprising how many library strategic plans have been supposedly completed/approved without commitment or provision of the funding required to achieve the objectives stated!

The product or output from a strategic planning or strategic review exercise which is a continuous process is more likely to take the form of a series of statements than a single end-product. These documents, which must be succinct and spare, written in clear jargon-free language, will provide a framework for policy-making and decision-taking. They may include briefing/discussion papers, management reports and project proposals, as well as a *'family of plans'* supporting the top-level statements of vision, mission, etc. (such as the plans of teams or specialist units within the library, marketing and business plans relating to particular products or services). Together they form a *'hierarchy of objectives'*, taking the reader through from service strategies to operational tactics.

Developmental Operations Management

Why do so many strategic change initiatives fail? We can all point to examples of promises not kept, problems not solved, projects scaled down or abandoned, planned improvements that did not happen. Failing to take full account of the financial implications of strategic objectives and to negotiate and secure the resource base for change is one reason. Another (perhaps the most common) is not following through from strategy to action - not articulating your operational plans and assigning responsibilities for getting things done. To translate your 'grand plan' into a successful cultural change programme, you must follow up your general statements of intent with specific action plans and budget provision, with tasks, targets and timetables.

At a practical level, one of the hardest things to get right is to manage time and priorities, to strike the right balance between maintaining existing services to an acceptable standard and working on improvements for the future. This is the classic dilemma - managing 'business-as-usual' alongside development and innovation. It is not easily resolved, but must not be ignored. A pre-requisite is to agree (as part of the strategic review process) your strategic priorities - the broad thrusts or major directions in which your library must move to realise the vision. This then enables you to identify the areas where success is essential, improvement is necessary and/or concentrated effort will bring the greatest benefit - your key result areas (KRAs), which must become a prominent element in your tactical and operational planning.

The difficulty of judging and achieving an appropriate balance between development work and day-to-day operations in terms of time management and staff deployment is a real challenge. If service developments take precedence over routine activities, standards may slip and you risk losing customer support when you most need it. But if you let "the urgent crowd out the important" and neglect development, your services will lag farther and farther behind competitors, which will also alienate customers - though the effects will take longer to show. Sometimes, with major projects (such as installing a new computer system or moving into a new building) you may be able to release staff from normal duties for full-time project work. Several commentators on library management structures have argued that we should have staff *permanently* assigned to *development teams,* following the model of product development teams in industry, and some libraries have actually done this - notably those operating converged library and IT services. For technically complex projects with critical deadlines it makes sense not to expose people to the frequent interruptions that occur in most service operations, but few managers of small and medium-sized libraries can afford the luxury of full-time project staff. Development teams then have to become part of a matrix management arrangement or *parallel organisation structure,* which at least has the advantage of ensuring service developers keep in touch with day-to-day operations.

Another cause of failure is to allow the desire for collective commitment and team ownership to confuse the issue of individual responsibility. It is essential to assign tasks and targets to named individuals and to spend time identifying enthusiasts for particular initiatives to drive the work forward and act as *'product champions'.*

Operational plans are the key to *connecting the strategy with everyday life.* Effective operational planning will enable you to integrate strategic and operational objectives. The essentials are:

- *be realistic* about your objectives, basing them on an informed assessment of the time and other resources required;
- *break down* assignments into manageable components, providing intermediate objectives or 'milestones';
- establish a *review process* that enables you to monitor, evaluate and rethink plans and priorities in the light of experience and circumstance.

Managers seldom give enough thought to the frequency, level and timing of reviews: it is important for senior management to keep in touch with how things are going, but not to the extent that colleagues feel that they are not trusted to get on with their work. Monthly monitoring ought to be delegated to service managers/team leaders, with less frequent reports to the senior team concentrating on any problems identified, proposed rescheduling or other resource implications. A key point here is the creation of an *enabling climate of trust and support,* so that people are not afraid to admit difficulties or mistakes, and know they can get help if necessary.

The *context* for operational planning is this business of translating the grand plan into an action programme, but there is also the issue of tracking back from tasks to strategy. The plans themselves need to serve as both practical *working tools* for daily use and a *quick reminder* of the library's strategic objectives.

To fulfil this purpose, the *content* of operational plans must include:

- the *mission* and *objectives* for the whole library;
- *functional objectives* for departments/teams/specialists units;
- their *priorities* and *goals* for the current year - including not only planned service developments and improvements, but also significant regular or recurring activities, defined here as those where timing is critical and/or the time commitment is substantial (for example, in a university library, induction tours for new students).

If you do not include both activities associated with the forward strategy and routine responsibilities, you will probably have problems with time management. For both categories, as well as assigning *names to tasks*, you

need to specify *targets with numbers and dates* so that progress can be monitored monthly.

Production of such documents is much easier now with the widespread availability of suitable software, enabling networked access and frequent updating to record progress and incorporate additions and changes. Use of spreadsheet/database packages facilitates sorting by date, section, individuals, etc., and it is also becoming easier to combine this type of data with other management information (for example, output from library computer systems and budget reports). Some libraries - notably Cranfield University in the UK - are starting to use Intranet technologies to disseminate planning information and supporting documentation to staff.[5]

While electronic communication offers the desirable benefit of reducing the volume of paper in people's in-trays, do not overlook the motivational aspects of periodic distribution of hard-copy versions to individuals and prominent display on noticeboards of graphical output showing volume of day-to-day activities and progress towards key goals.

Creating Change without Chaos

While change has become a way of life for most of us, managers still need to pay attention to managing the process of transformation. Experience suggests three things to bear in mind before you begin to plan and manage the change process.

1. *Resources (time and money)* - everything always takes longer and costs more than originally estimated.

2. *Fear of the Unknown* - some people welcome and relish change as stimulating and exciting, but most are worried or disconcerted by it, and many find it quite frightening.

3. *Evolution or revolution* - there is a significant difference between *incremental* and *discontinuous* change, and this should be reflected in how you communicate and manage the change process.

Following on from the above, and again drawing on personal and published experience, I suggest five factors to consider as a means of easing the process.

1. *Sharing the strategy* - know where you are going and what you are about. If you approach strategic planning as outlined above, this will give

your colleagues an overall frame of reference even if many details are unknown.

2. *Putting people first* - pay attention to their feelings, remembering that perceptions are often more potent and just as 'real' to the individuals concerned as actual facts, so managers must take them fully into account.

3. *Holistic view* - try to get everyone to focus on the 'big picture', the wider context of the external environment in which they are working, and the longer-term implications of recent developments and current trends.

4. *Creating a culture* - promote the view that change is the norm, so that you begin to create a climate that expects and accepts it, and build a culture which assumes continuous development, innovation and risk-taking.

5. *Talking it through* - communicate, communicate, communicate... openly and honestly, formally and informally, and far more often than you think could possibly be necessary!

The following advice is drawn from various writings on change management in the library field.

Ten tips to help get messages across:

1. Explain the reasons for change and state the benefits - to the organisation as a whole, and for individuals, but <u>don't</u> exaggerate.

2. Admit the downside and the risks, and show that you have some contingency plans if things don't work out as anticipated.

3. Identify concerns and provide reassurances (for example, that there will be training for new roles).

4. Involve everyone - invite them to contribute to the more detailed planning and practical aspects of implementation.

5. Allow people plenty of time to absorb information before giving them more.

6. Observe their reactions, listen carefully to their comments and questions, and make sure you are seen to respond to them.

7. Tap the 'rumour mill' - enlist the help of supervisors and spokespeople to obtain feedback on how messages are really being received. (For example, at Reading University Library, during our current

restructuring process, we formed a group of 'Change Advisers' drawn from a cross-section of staff, to act as a sounding board and advise senior management on the change process.)

8. Repeat messages as often as seems necessary and vary the methods and modes of communication.

    (At Reading, I have tried position papers, electronic mail, news-sheets, open meetings - with circulated transcriptions of questions and answers generated - and 'drop-in workshops' to discuss our mission, vision and values, as a pragmatic way of enabling all staff to participate in a large organisation.)

9. Treat people as individuals, recognising both group and personal concerns.

    (In addition to one-to-one and group meetings at Reading, we conducted a 'staff preferences survey' to ascertain people's interests and expertise, as well as asking for general comments; the response rate was more than 95%.)

10. Relate change to continuing professional values - point to continuity in constancy of purpose, commitment to service ethos, etc., to remind colleagues that some things remain unchanged despite appearances to the contrary.

The library leader's role in this process is crucial. Although I have talked about "balancing the business", in reality it is more of a juggling act, requiring constant attention and rethinking in relation to events. Change is a constant and we must manage it to our advantage, and this in effect means *creating* change rather than managing or coping with it, or having it forced upon us.

The role of the change agent has shifted from that of the know-it-all expert, selling staff his recommended solutions, to one of a facilitator-with-a-vision, coaching her colleagues in problem-solving techniques. The world around us is in chaos, but it is our job to create a climate of (relative) calm - a climate where people can perform effectively, where they are stimulated and excited, but stretched rather than stressed, and exhilarated not exhausted. Successful leaders will be those who inspire confidence, who are flexible and listen to the views of others, but ultimately decisive and prepared *to take personal responsibility* for change.

References

1. CORRALL, Sheila. Academic libraries in the information society. *New Library World,* 96, (1120), pp. 35-42, 1995.

2. MINTZBERG, Henry. *The rise and fall of strategic planning.* Englewood Cliffs, NJ: Prentice Hall International, 1994.

3. CORRALL, Sheila. Strategic management of information resources: planning for a better future. *The Law Librarian,* 26, (3), pp. 399-403, 1995.

4. CORRALL, Sheila. *Strategic planning for library and information services.* London: Aslib, 1994. (Final section contains a short annotated reading list including case studies of library planning in public, national and academic libraries.)

5. BEVAN, Simon and EVANS, Janet. Managing the Library Intranet at Cranfield University. *Managing Information,* 3, (9), pp. 38-40, 1996.

Further Reading

CORRALL, Sheila. An evolving service: managing change. In: Dempsey, Lorcan et al. *Networking and the future of libraries 2: managing the intellectual record.* London: Library Association Publishing, 1995. pp. 45-61.

CORRALL, Sheila. *Strategic management of information services: a planning handbook.* Aldershot: Aslib Gower, 1997 [In press]

The Local Academic Library within the Worldwide Context: Changes, Directions, Realities

Margaret Beckman
Beckman Associates Library Consultants Inc., Waterloo, Ontario, Canada

John B. Black
Field Support and Telecommunications Service, International Federation of Red Cross and Red Crescent Societies, Geneva, Switzerland

Margaret Beckman is president of a library consulting consortium specializing in planning and design of library buildings and the management and provision of information technology based library services. Previously she was Chief Librarian and Executive Director of Information Technology at the University of Guelph (Ontario, Canada). She has co-authored three books on library building planning, written numerous articles, and given many presentations or lectures in both Canadian and international locations. She has received several awards including two honorary doctorates.

John Buchanan Black assumed the position of Head, Field Support and Telecommunications Service, International Federation of Red Cross and Red Crescent Societies, in September, 1996 in Geneva, Switzerland. Previously he was Chief Librarian, University of Guelph, Ontario, where he also held an appointment as Professor of Political Studies. He has served as a consultant, published, and lectured widely in the fields of information and communications technologies, electronic messaging and computer conferencing, library facilities and information systems. He has recently completed a term as President of the Association of Research Libraries (ARL), and is currently President of the Ontario Library Association.

Abstract

There are many indications of the changes which continue for library resources and operating systems: the rapidly increasing availability of electronic resources and their supporting networks is changing the fundamental basis of library work. The directions which academic research libraries are pursuing can be similarly identified, with the World Wide Web and new electronic publishing technologies among the most important.

However, it is the realities of the present environment which are most urgent, certainly in Canada, and for which solutions must be found if changes and new directions are to be addressed and pursued. These realities are both obvious and harsh: drastic reductions in collections, staff and operating funds and lack of physical space with no possibility of expansion or renovation.

As a response to the realities facing them, three adjacent universities in southwestern Ontario have agreed to pool their shrinking resources in hopes that this will put them in a better position to adapt to change and adopt new directions. Agreement has been reached to mount one library system in the three libraries, merging the catalogues and providing transparent access to multiple databases. Also planned is a joint storage library providing shared ownership of all holdings and taking advantage of an existing delivery facility among the three campuses.

1. Introduction

When you think about change and the direction which new technology is taking us, you could recall that Alice, when she was in Wonderland and facing decisions about diverging paths, asked the Cheshire Cat, suspended ominously above her head: (paraphrased) 'Would you tell me, please, which way ought I to go from here?' And the Cat replied in a most superior manner: 'That depends a good deal on where you want to get to!'

The Cat and Alice notwithstanding, we would like to illustrate that there are considerations, equally as important as destination, that may impact on the choices to be made.

Let us first place this presentation within a Canadian context, which includes some 36 universities, of which 12 meet the criteria in diversity of

123

graduate programs and enrolment numbers for their libraries to belong to the Association of Research Libraries (ARL), Washington, D.C. The 36 universities are spread across 5,000 thinly populated kilometres, with isolation, for students, faculty and librarians always a concern. The southern part of the province of Ontario is more heavily populated than the rest of Canada and there are some seven research libraries within a 200 kilometre radius of Toronto. Perhaps the most distinguishing feature of Canadian universities is that, although legally autonomous, they are all publicly funded, primarily on a provincial (state) basis; there are no private universities as known in the USA or the UK in Canada at the present time.

Against this background we will discuss the changes, directions and realities which face these universities and their libraries, and describe solutions which some are attempting to implement in the effort to deal with them.

2. Changes and Directions

As the Symposium program indicates, change is one of the most exciting and worrying issues facing universities and their libraries as they approach the next century. We have identified five changes or directions which are of most concern to Canadian academic research libraries.

2.1 The Web

The most pervasive change factor in both computing and telecommunications is the convergence of these technologies and the development of a highly networked environment, symbolized by its most visible application, the World Wide Web (Web).

2.2 Scholarly Communications

There are startling and continuing changes in the nature of scholarly communications, with a strongly identified direction toward increased electronic publishing, whether by academic societies, universities (including their libraries) commercial publishers or by individuals and research groups through self publishing, an increasingly viable scholarly communications tool.

2.3 Distribution

As well, there are new alternatives to the form of distribution of scholarly information, with a move away from the traditional journal produced by commercial publishers.

2.4 Commoditization

One such alternative is what we have called 'commoditization' of information, which deals with the unitary aspect of scholarly publications. The academic journal is being broken up into article components, with the scholar, librarian, or student able to access and retrieve information differently than through the traditional journal. This has important implications for the economics of information transfer as well as for several library activities:

- indexing and abstracting;
- cataloguing;
- collections organization and access; and
- document delivery.

2.5 Digitization

With the preservation of print resources as well as the space in which to house their constantly growing numbers still a major concern, digitization is being considered as a possible solution to both problems. However, there are drawbacks. The technology itself is not yet stable or standardized; for example, storage of the large files require expensive high capacity media whose longevity is unknown.[1] Also, as was noted at this Symposium a year ago, digitization of parts of a library's existing collection could be breaking the "Battin Dictum" and result in the purchase of existing collections twice.[2]

3. Realities

Just as important as the changes and directions in information technologies are the realities which face each library as it attempts to adjust to them.

3.1 The Nature of Change

Both the uncertainty and the rapidity of change are among those realities. Fred Lancaster has suggested that the inevitability of technological change is "merely a manifestation of the law of acceleration of progress"[3] and confronted with such inevitability, librarians are accused of being conservative and resistant to change.[4] This is not entirely true because libraries have always been subject to change, from the time of the cuneiform tablets, through illuminated manuscripts, Gutenberg, the sheath, card and online catalogues, the typewriter and the computer. It is the rapidity of change and

the implications which this has for financial support, which is outside of librarians' control, that has been the real problem. Such change has been accelerating since the early 1960s, as libraries attempted to match the expansion of the power, capacity and functionality of computer, communications and information technologies.

For example, in many Canadian libraries, the battle with administrators for the funds to implement a newer automated system is barely won before developments can make the newly installed system obsolete. Library credibility is compromised when a campaign for yet another or an upgraded system must begin again.

3.2 Academic Funding

The second reality, in Canada, at least, is the status of funding for universities and their libraries. Modest budget trimming began in the late 1970s and early 1980s, and academic libraries responded by using automated systems to make technical services modestly more efficient, by cancelling duplicate subscriptions and merging some branch libraries. With the advent of the present decade, massive reductions in funding for universities have become a way of life, as provincial government priorities have focused on deficit reduction. This has been particularly difficult for units such as the library, which are defined by university administrators as academic support, a category with less priority than teaching and research functions. Evidence for this trend is found in a study which confirmed that ARL libraries are receiving a decreasing percentage of university expenditures.[5]

In this environment, minor tinkering within the various library services will not achieve the savings which are required for the purchase of increased electronic resources, maintenance of existing periodical collections, purchase of CD-ROM stations, the retrofitting of student carrels with power/communications outlets, or the provision of appropriate student instruction programs. In order to survive, staff members have been retired early, periodical subscriptions and hours of service have been slashed, and many essential services have been discontinued.

3.3 Staff Development

As Marilyn Mason has noted, any library that spends significant amounts on hardware, software and communications lines without investing in staff

126

training is throwing money away.[6] There is no question that the need for staff development is essential and constant, with librarians responsible for provision of the focus and leadership for training programs for staff at all levels. However, Canadian libraries are finding it difficult to justify this expense for staff members at a time when services to students and faculty are being curtailed.

3.4 The 'Web'

Existence of the Internet and the World Wide Web opens up tremendous opportunities for access to a wealth of information for both library staff and users. At the same time, the Web contributes to the view that libraries are becoming irrelevant and that end users will be able to retrieve everything they need from the Web themselves. The Web also expands user expectations, particularly those of students, in terms of both 'on site' and 'gateway' facilities within the library. This increases pressure on the institution to develop an appropriate support infrastructure, frequently at the expense of library funding for traditional library services and collections.

3.5 Physical Facilities

A separate issue in itself, although related to funding, is the status of the Canadian academic library buildings which house the print resources that still make up the bulk of the collections, as well as the work stations for students and staff members associated with them. Most Canadian university libraries were newly constructed or expanded in the late 1960s or early 1970s; they had reached or surpassed their capacities by 1990, both in collection housing and technological support. The possibility of additional new space is remote for the foreseeable future, and reorganization and renovation projects or off-site storage are the most common response to a space crisis or to the need for technological support systems.

However, the open access compact shelving which would increase collection capacity, or the introduction of new power and communication distribution systems into older buildings are both very expensive. Sufficient funding is difficult to obtain, as discussed, and frequently such projects have to be spread over as many as 10 years before they can be completed and any real benefits realized.

As well, many university administrators have accepted what has been called the myth of the electronic library. This myth has developed because

127

of the rapid increase in scientific and technical information and a belief in the inadequacy of traditional library methodologies. It is also believed that there is a technological force for change that is so strong that its consequences are inevitable, including the elimination of the library as place.[7] Believing this myth, universities are not enthused about supporting changes to facilities which, they are convinced, will soon be redundant.

4. Solutions (temporary or otherwise)

While it may be expedient to believe the myth and assume, as we suggest many university presidents are inclined to do, that books will be superseded by electronic formats and the library facility replaced by networks and workstations, the time line for the obsolescence of print resources and the demise of the library building has not yet been established. As Richard De Gennaro noted recently: "We will have to maintain the traditional library for a long, long time ... with a gradual building of the electronic library at the same time."[8] Academic libraries must continue to acquire and shelve books, periodicals, documents, maps and other print formats in addition to the new electronic resources. Furthermore, they must make them all accessible, both physically and bibliographically; they must provide access, network and gateway instructional programs for students and faculty; they must keep abreast of and trained in the newest systems and services; and they must do this with fewer staff members and with reduced acquisitions and operating budgets as well as within crowded and outdated physical facilities. How can this be done?

Three Ontario universities: the University of Waterloo and the University of Guelph, both ARL members, and Wilfrid Laurier University are located within a 30 kilometre triangle in southwestern Ontario; together they have an enrolment of more than 35,000 students. Their libraries, with the support of the university presidents, have recently reached agreement on a solution which, although acknowledged to be temporary, will delay an absolute crisis in the provision of space, services and resources for the next decade. They have attacked two of the reality problems identified above: funding and space, and their plan is described briefly below.

4.1 Systems

The cost of constant replacement or upgrading of three local operating systems will be contained by an agreement to purchase one integrated

automated system to be shared by the three libraries; a system which will handle full text, graphic and sound information sources whether held locally or available via the Internet.[9] Three catalogue databases will be merged into one, so that a student or faculty member looking at the catalogue from any campus will see a single bibliographic record with multiple holdings information representing whichever of the three libraries holds the title. Searching can be either in the global database or within the individual location. At the same time, the user databases will also be merged, making anyone on any of the three campuses an equal player on the other two. The concepts of interlibrary loan or interuniversity borrowing will disappear.

Equal borrower status, coupled with a three university delivery system which already exists, provides the infrastructure for a comprehensive document delivery program. Users will be able to request an item from another campus and have it delivered, or travel to the other location and gain access with the same ease as if the desired title were located in their home library.

Since the new system supports electronic order functions, potential order duplication can be identified at source. As well, access to databases now mounted separately on local CD-ROM networks will be accessible, equally, to all campus users. This seamless integration of systems, library catalogues, databases, electronic resources and advanced learning multimedia technologies will allow the combined library budgets to give the three campus communities access to significantly more information resources and their supporting technologies at, importantly, a sustainable cost.

4.2 Space

The library space problems, which are drastic on all three campuses, are being addressed at the same time through the use of a joint storage facility, in rented space, for less-used information resources. Duplication of the holdings, primarily early volumes of academic periodicals, will be eliminated, and material stored in the facility will be the joint property of the three libraries, with records appearing in the joint catalogue. Requests for material from the facility will be made electronically, with delivery normally within the business day. Limited reading facilities for researchers will also be provided at the storage facility.

129

Both solutions, shared systems and collection storage, demonstrate a positive response to the realities of the electronic age in the Canadian academic environment. With agreement on the system and storage ventures a reality, other avenues of mutual financial benefit are being explored. One library is experimenting with outsourcing for cataloguing, in spite of the passionate arguments which Michael Gorman and others have raised against this "drastic strategy".[10] Use of the increased electronic functionality of the new system for circulation and reserve processes, and the sharing of staff training programs are other projects with potential cost saving possibilities identified. These and other activities will release librarian expertise at each library for increased attention to access, retrieval and instruction related to electronic resources, and hopefully will permit a transfer of funds to collection acquisitions as well, without a reduction in service to library users.

5. Conclusion

This specific example of an agreement for the sharing of systems, resources and space is but one of a range of similar experiments occurring in other areas of Canada. The reality of the financial situation facing many local libraries makes fiscal considerations the primary focus in the strategic planning for electronic libraries. It may be that the Cheshire Cat, before he so blithely told Alice that the problem of direction could be solved by knowledge of the destination, should have asked a relevant question first: 'How will you pay for the journey?'

References

1.   CONWAY, Paul. Digitizing. *Library Journal*, February, 1994. pp. 42-45.

2.   ANGILETTA, Anthony M. On the relationship of academic program and research libraries at the electronic frontier: something old, something new, something borrowed, and someone's probably blue. In: *Electronic documents and information: from preservation to access; 18th International Essen Symposium, 23 - 26 October, 1995.* Essen, Universitätsbibliothek Essen, 1996. pp. 21-29.

3.   LANCASTER, Frederick W. *Information professionals in the information age.* Bertha Bassam Lecture in Librarianship No. 6.

Toronto, University Faculty of Library and Information Science, 1982. p. 2.

4. BIRDSALL, William F. *The myth of the electronic library: librarianship and social change in America*. Westport CT, Greenwood Press, 1994. 206 p.

5. ST.LIFER, Evan and ROGERS, Michael. Research libraries must find new ways to do business. *Library Journal*, April 15, 1993. pp. 14-15.

6. MASON, Marilyn. The future revisited. *Library Journal*, July, 1996. pp. 70-72.

7. BIRDSALL. op. cit.

8. DE GENNARO, Richard. Departing shots from Richard De Gennaro. *Library Journal*, November 15, 1995. pp. 30-31.

9. GILLHAM, Virginia. *Library cooperation in southwestern Ontario*. Paper presented at the Canadian Library Association Conference, Halifax, Canada, June, 1996.

10. GORMAN, Michael. The corruption of cataloguing. *Library Journal*, September 15, 1995. pp. 32-34.

The Morphing of Research Librarians in the New World: Or, Myths and Realities of Professional Choice and Voice

Anthony M. Angiletta
Stanford University Libraries, Stanford, California, USA
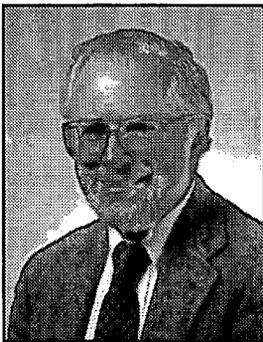
Anthony Angiletta is Assistant University Librarian for Collections at Stanford University. He is a member of the National Digital Library Federation Planning Task Force and a member of the Steering Committee of the Social Sciences Digital Library Consortium. He is a consulting editor to the digital publication of Historical Statistics of the United States.

Abstract

This paper briefly explores the nature and relevance of the term "professional" as it applies to research librarians in the face of apparent persistent and substantive change in the organizational structure and technological infrastructure of large research libraries. It explores the historical development of the research librarian as an organizational professional and poses questions regarding the intrinsic limitations of the autonomy of professionals in organizations. It particularly addresses the issue of choice and voice in determination of functions and roles of research librarians in a mixed electronic and print environment. It compares and contrasts the established faculty, corporate professional, and

paraprofessional models as they relate to research librarians and explores the dilemmas of "servants of enlightenment" as university employees, members of professional societies, and as personal professionals.

Introduction

Herb White has referred to a report that listed bank tellers, telephone operators, and librarians as endangered species. Librarians, presumably, will go the way of that other class of intellectual clerks - medieval scribes. While we usually identify technology as the culprit for such decline or disappearance, I suggest that, in the case of librarianship, the profession, the craft, and the institutions of which they are part are partially to blame, if not for the fact of looming functional extinction, then at least for the failure to be interesting enough as a subject of study.

In order to have at least a patina of academic preparation for this paper, I inquired to the scholarly literature of organizational studies and cognate areas over the last 8 years. In English, I found more than 150 citations on various keywords such as "professionals", "professionalism", "professions", and in combination with a host of subject phrases associated with the truncation of "organization", "occupation" and other terms. Of these 150 articles, only 2 mentioned librarians or librarianship. Engineers, nurses, CPAs, social workers, school teachers, and even HMO'd doctors and psychologists, were the subjects of analysis or at least mention; but, of librarians, virtually nothing. On the other hand, both *Library Literature* and *LISA* had a number of articles on these phenomena as did the trade and professional journals of the occupations I have mentioned. However, again, librarians and librarianship as a subject of inquiry looked at from outside the craft were hardly salient at all.[1]

All libraries are socio-cultural and economic units that serve identifiable symbolic and material functions. Research libraries, among types of libraries, have the largest per unit absolute number of employees, the greatest diversity of classes of occupations, and, arguably, have both felt and reciprocally caused the greatest impact of technological change during the 1990s - at least in their own arena. Yet, the scholarly literature is almost silent on the institutions and people in them, leaving the discussion almost entirely to the trade itself or in boundary areas such as so-called "information science" and the now vast area of computing and networking publica-

133

tions. In the midst of "reinventing libraries" and "transforming the profession", no one but "information professionals" seem to care. I wonder why?[2]

A good friend and mentor told me that a century ago, one of the ordinary and widespread roles of librarians was to provide the indexing and table of contents of journals to faculty and students. To "provide" was actually to do the indexing and table of contents. For those of us who have been librarians in the last 40 years, such an ordinary task, while not never performed in particular fields or disciplines (some foreign language and area studies come to mind), has been an information function largely left to the publishing marketplace and governments. Where the marketplace or state failed to provide the information, one might still encounter the librarian as "bibliographic ferret".

To some extent, it was the interplay between the marketplace and the progressive expansion of journal literature throughout the Twentieth Century that led librarians to abandon the role of indexing so that they might be able to do other things. Hence, the rise of the mass publication of journals and other serials, the expansion of the number and size of universities, the requirements of publication for advancement and reputation, the simple expanding pursuit of knowledge, especially but not restricted to the scientific and technical realms, and the initial entrepreneurial recognition of H.W.Wilson - all coincided to make bibliographical indexing a commercial or, at least, a non-librarian activity. In terms of the craft and evolving profession of academic librarianship, a "helping" familial task such as indexing to aid scholarly navigation and imagination in a low-volume environment became, because of orders of magnitude greater volume in knowledge output, a feasible corporate commercial activity whereby libraries went from being producers to purchasers of indexing and other bibliographic information.

What became clear in the post-WWII era was a differentiation of role between commercial publishers and those whose work was being published, on the one hand, and libraries and those who worked for libraries - that is, librarians. While there has always been some porosity at the boundary between publishing and libraries, the librarian, as an autonomous professional, could hire himself out to do supportive bibliographic tasks or could herself be the author of a bibliography or any other genre of authorship such as a monographic narrative. Hence, while librarians once did indexing as an integral part of their job description, when indexing became a marketable economic and commercial activity largely separate

from the library, librarians *qua* librarians were freed from this particular form of clerkdom. While librarians could be free-standing authors or could, within the ethical and legal bounds of their social contract with their university, "moonlight", second-job, or free-lance to provide, for example, indexing or proofreading for publishers' authors' manuscripts or for journal contents, there emerged a relatively clear-cut boundary between their professional calling and their labor contract, on the one hand, and their rights as an autonomous individual, on the other.

All of this occurred during a period when the Print Culture and the supporting array of technology or mode of production behind it reached climactic proportions. The fact that we are in the midst of fundamental changes in the mode of production supporting and conditioning scholarship leads us to inquire again about boundaries.

Of Boundaries and Classes. What is the boundary between the ethical and legal rights and duties of the autonomous professional and those of the organizational professional who is also an employee? Does the organizational professional not have autonomous professional rights and duties? Are they present but qualified by the fact of being an organizational employee? In the case at hand, we ask what can ethically and legitimately be asked of a person employed as a professional librarian in a large research library and who is a member of the academic staff of the university. We particularly address this issue in the context of four roles found in the creation and dissemination of scholarly knowledge - authors, publishers, librarians, and readers - a set of roles where financial exigency and technological developments can blur that which was fairly clear in an era where print media dominated.

To what extent, as a member of the academic staff, is the role of professional librarian similar to or the same as that of a faculty member?

Faculty, for example, have two primary roles as well as elements in their job description at the university. First, there is an expectation that they will contribute to Enlightenment by engaging in research, the product of which most often is seen as publication in the form of an archival unit of research such as an article or a book. We understand this research as a process culminating in archival units of research being made public and disseminated. For faculty, the social contract is such with the university that they may do research and publish results of research directly for their own individual credit and advancement so long as that research is sufficient in

135

quality and volume. We understand as well that they may use tools in the environment of the university such as laboratories, computer networks, and libraries. They may also seek to bring direct or indirect funding into the university to support their and their students' research. The university and faculty member have a symbiotic relationship in this regard - that is, each bring repute to the other, each may materially benefit the other. When a sufficient indication of a community of interests is reached between the faculty member and the university, and according to the governing norms of the Academy, faculty may receive special status conveying job security for the life of an ordinary career barring extraordinary misconduct by the faculty member or extraordinary exigency by the university usually taking the form of financial disability. (2) Faculty are also expected to teach at the graduate or undergraduate levels or both. This is done also for the purposes of Enlightenment and for social insertion, the two cardinal societal goals of the university. While much has been and will be made about the relative emphases of these two elements of faculty members' job descriptions, and some extremely small percentage of faculty members engage only in research by job description, research and teaching form the sine qua non of what a faculty member is and what her job is. "Other duties as assigned" for faculty members include university community or service activities and normally involve expectations of committee work, fundraising and alumni relations, etc. These secondary or ancillary roles indicate the faculty member's role in the primary university community of which he/she is a part. However, in most instances, they are not essential for continuing employment though they may have a bearing on promotion and salary. Most important, they are not necessary causes in an understanding of what a faculty member is or how a faculty member becomes a secure and permanent member of the university community. Finally, as autonomous professionals, faculty members not only may engage in free speech via publication and public pronouncement, but are free to hire out their labor and skills in any market they choose, including the extended extramural Academy (learned societies and "communities of scholars") and civil society at various levels. What they may not do depending upon the internal rules of the particular university at which they are employed is engage in activities or behavior constituting conflicts of interest such as double employment, violate the laws of civil society, or engage in behavior proscribed by the norms and regulations of the university such as sexual harassment of students.

So, for the faculty member there are 4 realms:

1. the realm of the essential job description;
2. the realm of other duties as assigned; and
3. the realm of the personal professional;
4. areas of overlap between (1) and (3).

All other employees of the university "serve at the pleasure of". While practice and reality in the balance of power between the administration of the university (Boards of Trustees or Regents, Presidents and Chancellors, a number of functional area vice-presidencies and vice-provosts, and the academic provostial and decanal areas) and faculty varies over time and from university to university, faculty are regarded as co-governing and from whose ranks come those who populate the chief academic offices.

Those who are "non-exempts" - that is, those technical, clerical, and other job categories subject to the National Labor Relations Act and various state statutes - would appear, at first glance, to be the most vulnerable to financial and market conditions that reduce or eliminate job tenure. Indeed, in the case of my own university - Stanford University - during retrenchments in the early 1990s caused by financial distress called Repositioning and Restructuring, the great majority of positions lost were in the non-exempt sector. On the other hand, in the labor contract that non-exempts have with the University and as provided for by statutory and administrative law, the number and kinds of tasks found in one's job description are expected to be finite and determinate. What is particularly lacking are legally binding and ethically sanctioned open-ended "other duties as assigned". While practice has shown variation in the degree to which these laws and norms are followed, for the most part, for those situations where unionization is not present, universities regard social contracts with "non-exempts" to be a labor contract governed by national and state law and not mere custom. To some extent as well, "benevolent paternalism" notwithstanding, universities have operated in a more community-oriented way toward its non-exempts and this has largely restrained occasional attempts at greater unionization than already exists. This, in turn, is partly a result of the diversity of non-exempt roles within universities, particularly among clerical-technical personnel which include library and information resources paraprofessionals who may serve in as small as 2-person work units. This, of course, also includes paraprofessional secretarial staff found in academic departments, and where their role is often singular and highly valued. However, as financial exigency and technological change have intensified,

respectively, the stability long experienced in these job classifications and billets - library and information resources and secretarial paraprofessionals - is in question. However, what is not in question is whether or not paraprofessionals are subject to national and state labor laws and whether or not they are expected to have finite and determinate job descriptions.

Where these matters come together regarding what may appropriately be expected in time spent and in kind of tasks undertaken on behalf of the university as distinguished from the personal and personal-professional realms, is in the area of permanent professional employees of the university. The faculty member is essentially an autonomous professional who paradoxically also has an organic relationship to the university - that is, he/she not only is the abstract free individual selling his/her labor to the corporation called the university, but is also an integral member of the university corpus itself as a community of scholars and of an extended extramural community of scholars such as a learned society in a network of universities and academic units.

The organizational professional, on the other hand, from one perspective, may or may not have or be expected to have extended extramural professional associations, may or may not have or be expected to have independent professional standing and achievement by whatever the norms are of that profession, including publication. At base, what controls the organizational professional's work life is the set of relatively open-ended tasks expected to be carried out within the defined support or service role his/her structure represents in the university. As "exempts", they are not subject to the NLRA and may be asked to carry out duties not directly or only marginally related to their precise job description ("other duties as assigned"). Hence, at the abstract and general level, the organizational professional known as the librarian resembles the faculty member in that they both have essential job descriptions and other duties as assigned. What they do not share, on the other hand, despite some librarians carrying out similar tasks as faculty such as teaching curriculum-based courses, donor relations and fundraising, is the organic co-governance relationship to the university. It could be argued and should be argued that as "academic staff", librarians do not merely serve or support research, teaching, and learning, but are essential and organic to those core features of the university's mission. If distinctive knowledge creation (research), distinctive knowledge transfer (teaching and learning), and distinctive knowledge dissemination (publication and social insertion) are the core

values and hallmarks of a research university, then university libraries, *if they are essential and organic to the fulfillment of universities' missions*, must also be able to perform distinctively in support of those values and hallmarks.

At Stanford University, over the last 30 years, the recruitment and retention criteria of the University Libraries were, in fact, directed at establishing and maintaining a set of responsibilities held in trust between the faculty, Administration, and students. At the same time, the Libraries' programs and the professional staff constituting it were to be an autonomous realm of specialization and an essential arm of scholarship. The autonomous realm of specialization included expectations that librarians would organize and conduct their programs in a distinctive manner in order to serve the needs of their primary clientele - faculty and students. As an academic activity, librarianship was also distinguished from other service sectors of the University insofar as librarians not only had to know how to identify, acquire, provide bibliographic access to, and interpret primary and secondary resources for faculty and students, but be able culturally and intellectually to engage and carry on intelligent discourse with that primary clientele. In many billets, especially those associated with the Collection Development Program, graduate degrees or training in fields covered in the academic programs and departments served, was and is the governing norm of recruitment. This latter criterion has always had the cultural objective of having librarians regarded as "Academics" or, minimally, "quasi-Academics" by faculty and the University and not mere service personnel. And this was instrumentally related to the expectation that advanced degrees or graduate training in a field would provide a foundation for ongoing peer-like discourse and relations.

In the extended extramural professional realm, librarians were expected to participate regionally, nationally, and internationally, in activities related to research librarianship and scholarship. An integral part of such extramural professional activities has been the expectation that, as academic staff, librarians would work within their professional society or its arms to improve standards and practices. Though no longer required for promotion and continuing appointment - thus severing the library version of "publish or perish" - this has also included for the members of the Collection Development Program an expectation of publication in scholarly journals or in the trade journals of the profession.

139

At Stanford and other large research libraries, technology and financial exigency have caused a rethinking of the role of libraries and librarians; however, the essential expectation remains that subject-specialist librarians shall not only have a knowledge of and about the scholarly fields they support, as well as those fields' literatures, but also a continuing knowledge how information for scholarship is created and disseminated in an environment where print and electronic media co-exist. What remains the constant for librarians in an actually changing technological environment is the requirement that they distinctively serve and support their primary clientele - faculty and students. Most generally, this support has taken place in three general areas - resources selection and acquisition, resources organization, classification, and access, and resources interpretation (mirroring the traditional tripartite division among collection development, technical and access services, and reference and information services). The means used to accomplish this have included conversation, training, teaching and instruction, the production of printed and electronic guides to resources relevant to academic programs and available intramurally and extramurally, the continuing acquisition and access to a sufficiently broad and deep reservoir of resources regardless of medium or format, and the organization and classification of the same. Also, librarians may and have served these functions and their primary clientele in a once-removed way by participating in consortia with other institutions.

This is a substantial professional calling with a demanding workload and has been so since the mid-1960s. While there have been expected variations in performance and productivity at the individual level, the aggregate product of the research librarians at Stanford and elsewhere has been distinctive and, in the case of Stanford, this has been recognized in survey research questionnaires and interviews conducted where the salience and utility of the librarians has been posed.

We will belabor the obvious by stating that research librarians have been on the horns of a "both/and" dilemma for more than 5 years. This has been taking place in the context of the requirements or choices made in the various "R" words - repositioning, restructuring, redesign and reengineering - within our universities and our libraries. What is needed, on the other hand, is for research librarians, as organizational professionals expressly recognized as part of the academic infrastructure of the university, to confront among themselves what it means and will mean to be a research librarian over the next decade or more, what the optimal organizational

division of labor under conditions of constraint ought to be for members of this "helping profession", what the limits of productivity are before they are reached and surpassed (a workload issue), what constitutes the realm of personal-professional ambition, achievement and work (i.e., learned society and professional association work, publication, consultancy, etc.), and, as in the case of the faculty member, what are the overlap areas and mutually exclusive areas between the work of the university and the work for oneself.[3]

Hence, several questions arise which are interrelated:

1. Given the rhetoric and reality of technological change as well as the requirements of financial constraint, what is the most effective allocation of human resources within research libraries as a whole for the acquisition of and access to resources for research, teaching and learning? This is the <u>division of labor</u> issue.

2. Given the both/and dilemma and attendant issues of doing too much and not doing it distinctively, how do we deploy our personal resources in a way that is productive and how do we organize work days, weeks, months, and years for professional research librarians? This is an <u>immediate and continuing workload</u> issue.

3. Given that the organic co-governance nature of research librarian positions is missing in the university, how does one sort out the realms of:

   a. our obligation as organizational professionals to the primary work unit: the university

   b. our obligation to the extended profession of research librarianship, and

   c. our obligation to ourselves as personal professionals.

This is the <u>ethical issue</u>.

These questions are posed in order to provoke discussion and to avoid at all costs the absence of dialogue on such matters. To avoid dialogue or to avoid conflicting stances is to invite the definition of a research librarian to be the <u>outcomes</u> of other persons' acts, or other forces' effects - whether this be the administration of the university or library administrations' actions, markets, or the all-too-visible hand of technology.

141

The active and engaged research librarian as organizational and personal professional, on the other hand, regards him or herself as an integral part of the dialectic or dynamic that critically and self-critically gives rise to the new definition and new role of the research librarian at their own university and beyond. As libraries find themselves by accident or design involved or potentially involved in activities that cross borders that once seemed marked by hard boundaries in the world of authors, publishers, libraries, and readers (as well as the hitherto existing nexus between publishers and libraries called vendors), one should pause and ask whether and how one can draw a distinction between that which the university and its arm, the university library, can legitimately and ethically claim as part of the social contract between librarians and the university.

There is a force majeure or sovereignty argument in this matter. That is, the university, within its own domain and according to its own regulations and within the bounds of ordinary reasonableness provided for by civil society to corporations, can require organizational professionals to do what it regards as in the best interests of the university. This is more or less, the take it or leave it argument.

One should note, however, that this is a reductionist argument analogous to eminent domain in the civil realm. That is, the university and its arms are most often open to discourse on such matters long before such power is granted or authorized for use. Hence, while this is hardly co-determination or co-governance, the university, within the bounds of fiscal necessity, leaves not inconsiderable leeway to its academic arms, including its libraries, for internal management and organization.

In the case of subject specialists and the congery of activities associated with "reference and information services", having "voice" matters only if those in the program have the opportunity and will to raise questions, argue, and take positions which serve the mission of the university library, the information societies of which we are members, and one's own personal professional goals. To do less even in situations where the Library is a recognized Estate of the University, invites administrators and managers to define what the research librarian is and will be as well as what they do and will do.

We come full circle then, from the historical case of librarians as indexers to the close of my presentation here last year where I raised the spectre of boundary-crossing led from above as "other duties as assigned". We come

full circle to a knowledge production, discovery, mediation, and dissemi-
nation environment where technology allows individual libraries as well as
groups of libraries to create and publish, for example, digitized corpora
derived from their print collections, but where sales attitudes and the very
commodification of information so condemned by librarians of all ranks
can also include notions of librarians as information manufacturers,
merchants and merchandisers. I suggest that the career path, if not the
calling, of librarianship requires that librarians as professionals, not as mere
employees, must question, debate, and "set the parameters", as they say,
of acceptable roles lest they be set for them.

References

1. A search of *ABI/Inform* and *Sociological Abstracts*, the primary
    indexes for organizational studies, management science, and the
    sociology of occupations and professions, was made for the years
    1989-1996. In *ABI/Inform*, for example, in order to discern scholarly
    studies employing social scientific methodology, a search was made
    for works that included a combination of the truncated thesaurus
    terms "organization" and "experimental/theoretical". 302 citations
    were found. When combined with the thesaurus terms "libraries",
    "librarians" or "library science", the number fell to zero. A search
    combining "organization" and "professionals" or "professional
    responsibilities" yielded 339 citations; but, when combined with
    library thesaurus terms, the yield was 5 citations, all of which were in
    trade or library science journals. In a subject search (broader than a
    thesaurus search in that it includes any mention of the sought term in
    the metadata and the abstract) combining "organization" and
    "experimental/theoretical", but controlled to exclude journal titles
    with variations of "library", "information", or "computing", 15,620
    citations were found. When the same search was conducted with the
    subject variations of "library", 27 citations were found, of which only
    8 were actually in the areas of organizational studies or management
    science. That is, 1/20 of 1% of the cited works focused on or included
    librarianship and were found in the scholarly literature of organizational
    studies, management science, or the sociology of occupations and

143

professions. Finally, in *Sociological Abstracts*, for the same period, of a total of 12,546 citations where variations of "library" were combined with variation of either "organization", "profession", or "occupation", only 16 citations or slightly more than 1/10th of 1% were found.

2.   There are some exceptions, but the stress is on the exceptional. See, for example, Annette Davies and Ian Kirkpatrick, "Face to Face with the 'Sovereign Consumer': Service Quality and the Changing Role of Professional Academic Librarians", *The Sociological Review*, 1995, 43, Nov. 4th, pp. 782-807, where user-centered management directions are correlated with a reduction in professional autonomy and control. See also, Stephen G. Green, Stella E. Anderson and Sheryl L. Shivers, "Demographic and organizational influences on leader-member exchange and related work attitudes", *Organizational Behavior & Human Decision Processes*, May 1996, 66, (2), pp. 203-214 (12 pages) where library employees were the subjects of a study on leadership and work attitudes. Finally, see also Fariborz Damanpour et al, "The Relationship Between Types of Innovation and Organizational Performance", *Journal of Management Studies*, Nov. 1989, 26, (6), pp. 587-601, where libraries are used as the subject for a study of the relationship between organizational change, technological change and administrative decision-making, and Patricia Reagan and John Rohrbaugh, "Group Decision Process Effective-ness: A Competing Values Approach", *Group and Organization Studies*, 15, (1), March 1990, pp. 20-43, where librarians were used as the subjects in a study of group communication employing the Competing Values Approach.

3.   The issue of what a research librarian should be as well as what they are becoming with or without regard to reflection is a major theme within the craft's core literature and cognate areas. Some would argue that librarians are dangerously close to being culturally and organizationally "fixed" and therefore incapable of making the changes necessary within their institutional settings. See, for example, Laurence B. Heilprin, "The Library Community at a Technological and Philosophical Crossroads: Necessary and Sufficient Conditions for Survival", *Journal of the American Society for Information Science*, 42, (8), Sept. 1991, pp. 566-573, where the notion of "self-regulatory adaptive systems" is borrowed from evolutionary theory and where librarianship may only survive by taking over the research agenda of

information science as well as making radical changes in continuing education. Others address the role of librarians directly within a transformed environment. See Lisa Covi and Rob Kling, "Organizational dimensions of effective digital library use: Closed rational and open natural systems models", *Journal of the American Society for Information Science*, 47, (9), Sept. 1996, pp. 672-689.

.

145

Chaos, Strategy and Planning: Can They be Reconciled?

Maurice B. Line*
Harrogate, United Kingdom
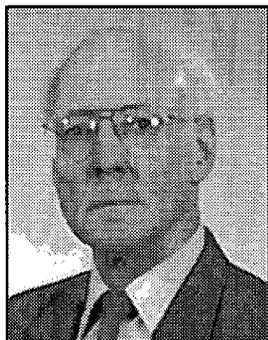
Maurice B. Line is a consultant in the library and information sector, specializing in staff development and the management of change. He retired in 1988 as Director General Science Technology and Industry in the British Library, which he served for 15 years. Before that he worked in five university libraries. He is a Professor Associate at Sheffield University, edits two library journals, and is on the Board of Directors of Engineering Information, Inc. He has two honorary doctorates and a Fellowship from Birmingham Polytechnic (now University of Central England) and is a Companion of the Institute of Management. He was President of the Library Association in 1990, and was awarded the medal of IFLA in the same year. Maurice B. Line has written on a wide variety of professional topics.

Abstract

Massive changes are occurring in the world in which academic libraries operate, as more and more information is stored and accessed electronically, and as there is a shift from teaching to self-directed learning and from one-off education to lifelong learning. The next decade at least will be one of chaos, during which old boundaries between libraries, computing, educational technology and teaching will be broken up. It is impossible to predict precisely what new patterns and structures will emerge, and it is undesirable to try to exercise tight control over the course of events. It is however essential to form some kind of vision of the future system of higher education and of the future information

---

world, and to develop a strategy for attaining the vision. The traditional strategic plan setting out firm programmes for the next three or five years should give way to a more fluid kind of planning in which flexibility and adaptability to change are key elements.

The World in Chaos

There is scarcely any part of our world that is not in a state of upheaval. The power of the nation state is yielding to a combination of globalization and tribalism - the latter partly in reaction to the former. Some of the big multinational firms control more money than all but two or three countries. Communism has been totally discredited, though not yet totally eliminated from the globe, while capitalism and market forces have not yielded all the benefits claimed for them. Economic power is shifting from the west to the east. Population pressures in less developed countries are being felt in the developed world.

Moral and social values that had undergone little change over the last 100 years are being challenged. This is partly due to the much wider exposure we now have to ideas and values in the rest of the world; what seemed absolute now appears to be relative. The gap between rich and poor, which had shrunk considerably since World War 2 in most countries, has widened sharply in many, and this is not universally regarded as a misfortune; the pursuit of equality of opportunity is giving way to economic and social Darwinism. Liberalism in its broader sense is regarded by many as a dirty word, while economic liberalism has become almost a gospel. The principles, enshrined in the United Nations charter, of basic rights for everyone, never given more than lip service by many states, are now not even given lip service by some. The age of ideologies seems to be over; in their place we have numbers of untested ideas, some of them extremist. While all agree that there are severe problems, not only is there no agreement on solutions, but few trust anyone else to find solutions, least of all politicians. We are often urged by them to 'think the unthinkable', which too often means following their latest ideas (trusting the unspeakable).

All this adds up to what might reasonably be described as a state of chaos. It might be said that chaos is not new. Every country has its own chaotic periods. In Britain, one such period was the 17th century, which was characterized by enormous political, social and religious turmoil; and in

147

medieval Europe, the Black Death led to chaos. What makes the present situation different is that chaos is not confined to one country or region of the world; chaos has become globalized.

Of the changes mentioned in my opening paragraph, globalization is not only one of the largest, but it leads to several of the other changes. And one of the major forces behind globalization is information technology, particularly the ability of computers to handle enormous quantities of information and the developments in telecommunications that enable information to be transferred almost instantly to almost anywhere.

The Information World in Chaos

Since libraries deal with information, it is not surprising that they are undergoing more than their share of chaos. The factors affecting libraries are familiar: reduced funding from public sources, the capacity of the private sector to do much of what libraries have done, the ability of individuals to bypass libraries for an increasing amount of the information they want, insistence of their funding authorities on economic and social justification for all they do, and perhaps above all the fact that the very material that libraries handle is fundamentally affected by IT.

Publishing, which has this last factor in common, is also in a state of chaos; few publishers are bold enough to predict where publishing is going, or can even say what 'publishing' means when anyone with a computer can produce and distribute material. The future of indexing and abstracting services is more and more uncertain. Boundaries between publishers, the book and periodical trade, database producers and libraries are now very fluid, and there is little sign yet of where new boundaries will fall. The role and functions of national libraries and public libraries are challenged by one report after another: whom they should serve, what they should do, how they should do it. Industrial libraries have tended either to disappear or to turn into information management centres. Incremental change is on its way out.

Libraries in the public sector are especially affected. Hitherto they have been protected from the jungle around them, trading off lower salaries and an absence of thrills for job security - living in cages where they can feed and breed in comfort. The fences around the cages are disappearing fast, and public and academic librarians have to learn to survive in the jungle. When even the jungle is changing its nature, this is a tall order.

The World Wide Web, itself a chaos on which attempts are constantly being made to impose some order, is responsible for changes in the provision and dissemination of information that would have been inconceivable only five years ago. I have begun to divide my colleagues into spiders, who know how to manage the Web, and flies, who struggle in its threads fearing that they will awaken the World Wide Spider and alert him to the fact that supper is waiting.

Universities in Chaos

Academic libraries are probably the most stable type of library, since at least their clientele is assured - or is it? For the academic world too is in chaos. Not only is it also subject to immense funding pressures, but there are other forces that are having a more fundamental impact. The one that is least directly related to IT is the move to lifelong learning. The content of most degree courses, in science at least, begins to go out of date within five years, and after ten years much of it is obsolete. I have started to wonder whether degrees should have a 'sell by' date on them, and be expunged from the person's record after ten years. The only thing that is of permanent value, apart from a solid core of basic matter (such as mathematics in a science course), is the knowledge of how to learn. Graduates ought to be good at knowing where to find new information, how to assess its value, and how to use it. They ought also to be imbued with an inexhaustible curiosity, an insatiable hunger for knowledge. In today's unstable job market, where some jobs are declining and new ones coming into being, and where lifelong employment in one sort of job, let alone with one employer, is very much the exception, the ability to update existing knowledge and gain new knowledge is vital.

One major consequence is that lifelong learning will not only be necessary but will become more important than a first degree. Some large firms have recognized this and created what are effectively their own academies to educate and re-educate staff. One would expect universities to play a large part in the process of lifelong learning at higher levels: in the case of large firms a supporting role, in the case of smaller ones a main role. If they do not play a role, they will be missing a huge opportunity. If they play a role, it will certainly involve a great deal of remote learning, for which the technology is gradually becoming more adequate. The whole system of qualifications will need rethinking. So will the physical nature of universities; they will still need campuses, but they will change from mainly

149

centripetal to mainly centrifugal systems. (At sub-university levels of education, the public library may find a major future role for itself by playing a large part in lifelong learning).

The shift to lifelong learning is one fundamental change. Another, more closely connected with IT, is a shift from teaching to learning. This is being forced on universities by financial constraints - teachers typically account for about 70% of a university budget - and enabled by IT. It is also good in principle, since self-instruction is a much more effective form of learning than being taught. It incidentally ties in with another modern trend, an emphasis on individual responsibility: the onus is on the learner to learn, rather than on the teacher to teach. Teachers will not become obsolete; they will produce much of the educational software, they will mentor students, and they will still give some lectures and classes. But the balance between teaching and learning will change, and the teacher will no longer be the main resource in the university.

Another factor that will enforce change is the modern emphasis on the customer. The 'take it or leave it' mentality has almost disappeared from industry and business; people want and expect a choice, and will shop around or keep demanding until they get what they want. Translated to the academic world, 'the customer is king' philosophy becomes 'the student is king' - and the university becomes the servant. We are moving back to a situation like that in medieval Paris, where students effectively employed teachers. We can of course do better than medieval Paris, since we can tailor the service - not only the means and speed of delivery but the content - to the individual. I wondered if I was exaggerating the change - or expecting it too soon - until I saw it had already reached a quite advanced stage in one university I visited recently; there, students were working in study groups, and making requests for information and (to a lesser extent) teaching as and when they wanted them.

A major consequence of both these shifts - from one-off to lifelong learning and from teaching to learning - is that a rigid division between teaching, computing, educational technology and learning resources (which include the library) becomes both dangerous and increasingly meaningless. Moreover, the importance of learning how to learn makes it necessary to break down barriers between teachers and librarians. There has been a strong trend towards 'convergence' between libraries and computing in some countries, often for reasons of finance rather than of principle; in at least one British university convergence has become integration, to the extent

that the staff of the two areas have been merged. Convergence is in fact taking place in *learning resources* (e.g. educational software, books), *learning systems* (computers, libraries), and *learning suppliers* (e.g. teachers, librarians). The implication is that the entire university will need to be restructured if it is to serve the needs of society and meet the demands of individuals.

Chaos is Not Necessarily Bad

The above diagnosis may alarm you or exhilarate you - or it may be so familiar to you that you are wondering why I bothered to say it all. What it cannot surely do is to leave you complacent that you can all go on as in the past, when you could plan for next year by adding a bit the last (and then chop bits off because there was not enough money); for the changes are not incremental but fundamental. Incremental planning is, as noted above, on the way out - it is useless for dealing with chaos.

There is no need to be afraid of chaos as such, though some of its manifestations are unpleasant if not disastrous in the short term. In physics and biology, where chaos theory was first developed, it was found that what appeared to be disorder in fact possessed its own higher order. The chaotic processes were simply not being seen in the right perspective or with the right spectacles. If an attempt was made to interrupt them, the higher order was not attained. In some cases, a period of chaos was necessary because a process had reached a stage where gradual or incremental change was not sufficient to ensure survival: renewal was necessary. There are plenty of examples of this in nature. The huge forest fires in Montana some years ago were greeted as a major disaster, and efforts were made to control them; but it was found that where control was impossible the forest recovered more quickly than where control was attempted. In Australia, devastating bush fires every few years are known to be essential to regeneration. There are also many examples in human history of a country emerging from disaster much stronger than before it occurred. Japan is the most obvious example: only a massive disaster like the World War 2 could have swept away the stifling old imperial system, and by losing one war Japan won a more important one. One has no difficulty thinking of other countries that are currently encumbered with long obsolete features which no-one has the energy or courage to scrap, situations that only a major disaster would cure.

151

Chaos can often be triggered by a seemingly trivial and unrelated event. The classic example is of the butterfly in the Amazon flapping its wings and setting off a chain of events that ends in a hurricane. The library equivalent of the butterfly might be a civil servant who sneezes at a critical point in a discussion on library funding, or a government minister who arrives at his office on a critical day after an argument with his wife. We could probably all relate tiny events that led to large consequences. But chaos can also be caused by a build-up of several developments, as we are seeing today.

How Not to Deal with Chaos

I am not saying that cataclysms are always good for you. In the short term they almost never are, but in the longer term they may be necessary for survival. In the case of libraries, survival of what, though? Surely not libraries as such, since libraries are merely instruments to the end of ensuring the transfer of information (in its broadest sense). I will return to this issue later, and discuss now how one should deal with situations of chaos. They cannot by definition be controlled; as in nature, the attempt is bound to fail and will probably make things worse (which explains why many governments fail, and why bosses of firms under threat who react by trying to impose more order usually fail). It is also useless to try to ensure that things go back to the situation before chaos ensued (another weakness of governments and bosses). They cannot be ignored; people cannot retire into their fastnesses until the period of chaos is over, since people are an integral part of the chaotic situation. In any case, it is impossible to expect people to ignore situations that threaten their existence. So what can one do?

Planning of the old kind is not an answer. It was never easy to predict what would happen in the next three or four years, and it has now become totally impossible. Time after time universities, and libraries, work out detailed plans, which are totally wrecked by a government change of policy or a further cut in budget. I remember being asked a few years ago how a library in a less developed country could make sensible strategic plans in very unstable conditions; we in developed countries can now sympathize with them. Mintzberg[1,2] has articulated what many were thinking and more were practising, certainly in industry: that much strategic planning was not only useless but positively dangerous. A great deal of effort is put into five-year plans, which commonly suffer one of two fates. Either they are not acted upon after the first year, in which case they are a waste of time and

demotivating to the staff who helped to prepare them; or, worse, they *are* acted upon, in which case wrong trails will almost certainly have been pursued and opportunities will have been missed. I would very much like to see a study done of strategic library plans of the last ten years and their subsequent fate of both them and the libraries concerned; I suspect that some plans are so utterly forgotten that it is hard to locate a copy of them.

The Need for a Vision

This does not mean that one should not have a strategy, or that one should not plan: merely that the conventional process of planning needs rethinking. But nothing can be done unless the library has some idea of where it wants to be in, say, ten years' time. Unless there is some possibility that light will appear at the end of the tunnel, people will not enter it. It is therefore necessary to develop a vision towards which people can strive during periods of great uncertainty. The vision may prove unattainable, or it may not - almost certainly will not - turn out as desired (an experience familiar to early explorers). It would probably be wrong to say that any kind of vision is better than no vision, but to have no vision is to surrender to chaos.

Any human vision is bound to incorporate values, whether these are articulated or not. Systems cannot be quake-proofed, but ideals and values can. I mentioned earlier that many values we had come to accept as basic were being challenged. A value that is fairly recent in historical terms is the principle that everyone has a right to receive information other than what it is absolutely necessary to keep secret. While there can be dispute about what is 'necessary', it is nearly always much less than we are led to believe. It is noteworthy that extensive restrictions on information are without exception imposed by the nastiest regimes. Away from the sphere of politics, there is far less dispute about the right of people to be educated and to have access to published information. If it is a right of the individual, it is seen by the country as a necessity: countries of all political complexions, from Singapore to Cuba, from Iceland to China, recognize that education at all levels is an essential (if not sufficient) key to prosperity and stability, and that education depends on information. Authoritarian regimes also realize that whatever steps they take to restrict information are in the end doomed to failure by modern technology; a notable recent example is the use by Mesquito guerillas in Mexico of laptops and modems to let the world know what was happening.

One element in any vision of libraries must therefore be free (that is, unrestricted, not necessarily free of charge) supply of information. So far as the academic library is concerned, this involves the ability to know what there is on any topic and to have access to it. But since, as I have suggested, it will be impossible to consider the library as a separate unit in the university much longer, this must also be part of the university's mission. I simply do not see that the library can sensibly prepare a vision alone. It can however take the lead in the process of creating a vision; someone needs to, and I have seen little sign of any other part of a university taking steps in this direction. An ideal approach might be for the library to first sort out its own thoughts and then convene, or ask the university to convene, a Think Tank composed of imaginative and creative people who are concerned with the future of learning and research rather than with the protection of departmental territories or the expansion of personal empires. The members need to be brave people to, since their conclusions may turn out to be so radical that their careers may be at risk (if you see the writing on the wall before others you may be suspected of having written it).

The Need to Develop Flexibility

At the end of such a process the library as an organizational entity may disappear. However, the functions it performs will not disappear. The library may become part of a larger unit, or its functions may be differently distributed in a changed university structure. It should not be our aim to preserve libraries but to foster learning and research; if that can be done in other and better ways, that should not be a matter for concern. For one thing is certain: that most of the competencies of librarians will become more rather than less needed, because information handling skills (knowing how to learn) will be of prime importance and because the vast quantities of information available will need to be managed.

How librarian skills are deployed may however change substantially. Since chaos cannot be controlled, it can be survived successfully only if we keep a close eye on what is occurring, explore its possible implications and consequences, and adjust rapidly - if necessary radically. If this is to be achieved, two things are vital. The first is that there is absolute openness of management and total trust between managers and staff, and that staff are intimately involved in all thinking and plans. Without this, not only will necessary changes meet resistance, but the deep and varied resource that staff represent will not be fully used. I have to say that in all the many

libraries for which I have worked as consultant openness and trust are very rare - the library's boss may think they exist, but staff have a very different tale to tell.

The second requirement is that flexibility and the capacity for speedy response are cultivated. Systems and procedures must be capable of change, but above all staff must cultivate flexibility as if their lives depended on it - their jobs certainly may. Openness of mind, an unwillingness to accept textbook solutions, eyes that are swift to spot problems and to see opportunities, imaginations that can find ways to seize them - these are becoming paramount qualities. Some new skills, or the cultivation of existing skills, become important. The emphasis will be on transferable skills, which can be applied to a variety of jobs inside or outside libraries. Knowledge of IT is obviously essential: not just what it can contribute to the library, but what it is doing to the world of publishing and beyond. But above all, the library will need to be alert in its mind and quick on its feet.

The organization needs to operate as a whole. That does not mean that conflict should be suppressed: rather the reverse. It should be encouraged so long as it is not personal or destructive, for dispute and discussion are a fertile ground for new ideas. Total consensus in an organization is not easily distinguishable from slumber. The mood should be one of continual excitement and exploration. Systems and activities that have served their time should be discarded ruthlessly: as well as thinking the unthinkable, staff may need to unthink the thinkable.

As for bosses, they must not impose their own ideas or solutions on the library, or even their own analyses of the situation. Bosses often feel that they are losing control or not doing their jobs properly if they are not 'directing'. Chaos will ensue, they fear, if staff are left to work things out for themselves and not kept on a tight rein. But studies of chaos theory applied to organizations show that many bosses who can tolerate some seeming disorder and leave staff alone are more effective and better respected. Over-direction is much more common than under-direction, and much more damaging. The boss's job is to take the lead in developing a vision, to coordinate activities, to try to ensure that the abilities of all staff are exploited to the full, and perhaps above all to convey a sense of excitement - which is of course difficult if the boss is not excited him/herself. Sometimes - rarely - intervention may be necessary; experience and keen judgment are needed to recognize those few occasions.

'Sitting back' requires courage and a personal sense of security; it is usually the insecure boss who over-directs. The same courage and security need to be cultivated among staff. They too need to develop a tolerance of uncertainty, something that may prove hard for some librarians who have seen the imposition of order as their main task in life. If they are to be creative and imaginative, they must be sure that new ideas will not be rejected, and must also be given the freedom to innovate, including the freedom to take risks and make mistakes; for it is impossible to be right all the time in chaotic conditions.

It has to be said that librarianship is not a job that has normally been seen as an attractive one to innovative people. Though that perception is changing gradually, most libraries have staff who will not take kindly to the new chaotic world, and who would be much happier working within tight rules and boundaries. This is not the place to discuss how to handle staff who were recruited in different times with different functions in mind, but I believe that in many if not most cases such staff can be encouraged to shed their old clothes and can come to make a notable contribution to the new world in which they are finding themselves. They certainly cannot be bullied into imagination and innovation, and undue pressure will only make them feel more insecure. Staff who are truly flexible will know that wherever the library ends up in the organization, and even if they end up outside the library, they will have a part to play and be able to play it.

A New Kind of Planning

To handle chaos, then, a new approach to planning is needed. Chaos must not be feared; it cannot be managed, but it can be lived with, and its workings can be understood up to a point. We cannot see how or where things will go, but we can watch and work with trends rather than against them, exploring ways of adapting them for our purposes.

A vision is needed, which is part of a much broader vision of the university, and in the preparation of which all staff are involved. A mission statement may or may not follow, depending on where the library fits into the future scheme of things. A strategy then needs to be developed for working towards the vision, and plans made for the next year or so. But these will not be rigid plans. Few generals ever won many battles by sticking to a rigid plan; indeed, a characteristic of a good general is that he adjusts his strategy to the needs of the moment. So in libraries, changes in plans may be

necessitated at any time by new circumstances. And a main component of any plan will be the development of flexibility.

The main value of strategic planning was always in the process, rather than in the plan. For plans, though they were often useful in convincing the authorities that the library knew where it was going and had a strategy for getting there, were at best short-lived, and had to be revisited every two or three years. But the process, if it involved all or most staff, had effects that were much more long-lasting, for it developed in them managerial skills. It obliged them to think strategically, to think in terms of ends before means, to see their own part of the library in a wider context, and perhaps to work in teams. These virtues of strategic plans must not be lost, nor need they be.

A different style of management will be needed. This can be developed, and demonstrated, during the process of planning for incessant change. Staff must work as one, but the 'one' must be the product of debate, not a bland homogeneous one. There must be a constant atmosphere of openness and trust. In the process of change, it is likely that the organizational structure of the library (while the library exists) will also change. There are now a number of structures in libraries that might be considered experimental; there will be more before a new norm comes into being.

All this sounds very much like a recipe for an industrial organization. Libraries, it may be argued, are not industries, and need not adopt the behaviour of industries. There are differences, it is true, but many things that have always been important in industry have become just as important in libraries: cost-efficiency, lean processes, constant attention to customers - all these are indispensable for the modern library. There is a new similarity: the old belief that whereas an inefficient industrial firm would collapse, libraries were assumed to have a permanent life, is no longer tenable.

Conclusion

Chaos may not be good for you, and there are undoubted hazards ahead, but living with chaos can be exhilarating. I know it is easy for me to say this as someone who is no longer a practitioner in librarianship, but if I need to justify myself I will mention that I challenged quite a few sacred cows when I was a librarian farmer myself. I suffered in consequence attacks from various angry bulls, but numerous calves came to my aid. This is a point on which I want to end: that while not all established librarians may welcome

our present situation, the newer generation may have a clearer view and a more positive attitude, seeing in chaos at least as many opportunities as threats.

References and Further Reading

1.   MINTZBERG, Henry. The fall and rise of strategic planning. *Harvard Business Review*, 72, (1), pp. 107-114, 1994.

2.   MINTZBERG, Henry. *The rise and fall of strategic planning*. New York, Prentice Hall, 1994.

Some of the above issues were aired in a paper I wrote two years ago:

LINE, Maurice B. The road through chaos: the future role of the university library in the creation of knowledge. In: *Serving the scholarly community: essays on tradition and change in research libraries*, presented to Thomas Tottie... Uppsala, Uppsala University Library, 1995. pp. 13-22.

A more recent paper touching on some similar issues is:

LINE, Maurice B. Managing change in libraries. *Journal of Information, Communication and Library Science* (Taiwan), 2, (3), pp. 3-12, 1996.

Three books on chaos theory applied to management are:

STACEY, Ralph D. *The chaos frontier: creative strategic control for business*. Oxford, Butterworth-Heinemann, 1991.

STACEY, Ralph D. *Managing chaos: dynamic business strategies in an unpredictable world*. London, Kogan Page, 1992.

WHEATLEY, Margaret J. *Leadership and the new science: learning about organization from an orderly universe*. San Francisco, Berrett-Koehler, 1992.

A recent paper that emphasizes the forces that make change in universities and academic libraries necessary is:

STOFFLE, Carla J., RENAUD, Robert and VELDOF, Jerilyn R. Choosing our futures. *College and Research Libraries*, 57, (3), pp. 213-225, 1996.

Re-Engineering the Academic Library: New Services through Institutional Alignment & Leadership

Greg Anderson*

Massachusetts Institute of Technology, Information Systems, Cambridge, Massachusetts, USA

Greg Anderson is a technologist and professional librarian. He began his library career at the Library of Congress in 1978 where he held a variety of positions, including participation in the Library of Congress Intern Program. During that period he began working with user needs and requirements related to online catalogs. In 1984, he was appointed Head, Library Systems Office, University of Georgia Libraries where he served for four years. In 1989, he was appointed Associate Director for Systems and Planning, MIT Libraries. In this capacity, he was actively involved in collaborative efforts in the MIT Distributed Library Initiative (DLI). Since 1995 he is IT Discovery Process Leader in MIT's process-centered, team-based technology organization.

Abstract

Today there is an increasing body of management and administration literature speaking often and powerfully about the "process-centered" or "reengineered" organization. These organizational models, with a flattened hierarchy and a team-based approach to work seem to hold much promise for the commercial, for-profit sector. It is unclear, however, how these philosophies and approaches fit for academic institutions and for libraries in particular. This paper will explore the basic processes of research institutions, and how an understanding of these

* Greg Anderson could not attend the Symposium due to extraordinary circumstances.

159

processes can help a library align its services in order to serve its community more effectively. ReEngineering has become a polarizing term that has keen adherents and detractors. If libraries can move beyond a reaction to the term, the activities and processes can have a direct relationship to library information services and to the strategic directions of the library. Some current experiences in a process-centered technology organization will be explored, and some issues and discussion will be presented for discussion.

INTRODUCTION

As we approach the turn of the century, academic institutions and their libraries are being challenged to change dramatically in order to meet the requirements of increasing rates of educational change, constrained resources, new national and international imperatives, immediate and powerful communications, and increasing rates of technological and social change. Institutions must provide new services to a changing community and changing society. Each new year has some or all of these characteristics: new degree programs, restricted resources, more students - on campus and distance learners, changes in funding models, and, of course, increasing costs for library materials. Most library administrators must lead organizations with level or decreased funding while the parent institutions are increasing expectations that libraries and librarians will leverage technology to provide greater services at reduced costs. Most administrators understand further that there is little likelihood for additional resources to meet these new requirements. How, then, do academic libraries change while maintaining sustainable services that satisfy users? How do libraries re-assess their sustainable value to the university? How can libraries identify those activities that they can stop doing?

Academic/research libraries must respond to these challenges with actions that are integrated and aligned with their changing environment. Libraries must become more tightly aligned with the vision and strategic directions of their institutions. Long past is the era when libraries could conduct their operations with impunity and without question. As the structure of the entire academy undergoes dramatic changes, so libraries are being questioned regarding the value added to the education/research/service purpose of the university. Libraries are being required to remove work and to operate more effectively. And libraries are being required to respond to

greater and more specialized demand by a community that is creating new knowledge at ever greater rates.

This paper will present a model and some suggestions for libraries to achieve this synergy and efficiency and to offer some new perspectives on library processes as they relate to the purpose of the university. Identification, analysis, and understanding of library activities in the context of the university can assist libraries in creation of innovative services and for critical evaluation of current services. The key concepts involved in this approach are: ReEngineering, Processes, and Vision. The key organizational strategies are process identification, vision creation, and alignment.

This presentation is organized by the following outline:

- **Concepts**

  Definitions: this will provide definitions and explanations of the key concepts.

  Cautions: considerations for administrators before applying these concepts to a reorganization of the library.

- **Organizational Strategies**

  Processes: this presents processes for universities and for an Institutional ReEngineering effort.

  Library processes: this identifies processes for libraries as a function of its knowledge work.

  Implications: what are the ramifications of a process approach for library reorganization efforts and resource management?

- **Action Items**

  Suggestions for responding to the implications.

  What the academic/research landscape may look like in the next five years.

CONCEPTS

These definitions are not comprehensive; there is clearly a large body of literature surrounding each one. The purpose is to establish a common level of understanding, and to provide a working use of the terms as they are applied in this paper.

ReEngineering: Advocates "setting explicit, measurable, and highly ambitious objectives in order to achieve breakthrough results."[1] ReEngineering demands energetic work that seeks to realize the optimum work of the organization. It is based upon data, analysis, and highly innovative thinking to achieve solutions for the organization.

As a term, ReEngineering has elicited strong reactions from adherents and detractors. If we can move beyond the term, however, we find that ReEngineering proposes innovative approaches to organizations and the work they perform.

What is the object of ReEngineering? ReEngineering is not about organizational structures, nor is it about downsizing. Rather, ReEngineering is about the work processes in an organization. In a presentation to MIT administrators in November 1993, Michael Hammer, often acknowledged as one of the leading proponents of ReEngineering, described a work process as:

- a collection of business activities that creates value for a customer.

- a transformation of input(s) into output: a state change.

- emphasis on customer and outcome, not on mechanism: what gets done rather than what we do.

Processes are the heart of an enterprise, how a company creates and delivers value to customers, and they represent its real work, whether or not anyone is aware of them.[2]

In order to identify the processes in an organization, Hammer recommends that you "start with the customer and the customer's processes: define your business from the customer's point of view." In addition, you should "identify natural inputs and outputs (real things) and their state changes." Finally, Hammer advocates that organizations "focus on goals rather than actions: start with missions." An organizations mission should be a key element in the organization's vision.

Vision. To prepare for the future, an organization must develop a preferred view of that future and the role of the organization. The definition for vision used in this paper is taken from Mark Lipton:

> "A successful vision paints a vivid picture for the organization and, though future-based, is in the present tense, as if it were being realized now. It illustrates what the organization will do in the face of ambiguity

and surprises. A vision must give people the feeling that their lives and work are intertwined and moving toward recognizable, legitimate goals."[3]

An organizational effort to form a vision is an early step in organizational alignment. A library, for example, should be aware of the vision of its university, and the library should construct its vision so that it fulfills the promise of the larger environment.

Within the Library, a vision can be used in re-shaping the organization. Managing with a vision can benefit an organization in five ways:

- A vision enhances a wide range of performance measures.
- A vision promotes change.
- A vision provides the basis for a strategic plan.
- A vision motivates individuals and facilitates recruitment of talent.
- A vision helps keep decision making in context. (Lipton, p. 84-85).

If we consider the definitions for ReEngineering and processes, we can begin to understand the relationship that an organizational vision can have in helping to re-shape the library.

There are various components of a vision. Lipton states: "the visions of highly effective organizations communicated three messages or principle themes: the **mission** or purpose, the **strategy** for achieving the mission, and elements of organizational **culture** that seemed necessary to achieving the mission and supporting strategy. (Lipton, p. 86-88).

- **Mission.** Mission addresses the fundamental question of why an organization exists and why it is in business. What is its purpose? For whose benefit are all its efforts?
- **Strategy.** To achieve a mission there must be a strategy to give operational logic for what the company hopes to accomplish.
- **Culture.** Organizational values serve as the underpinning that directs and sustains this behavior. When people understand the desired culture - the values that support the purpose and the strategy - they know what is expected of them. (Lipton, p. 88).

Cautions: Concepts to Reality

Engaging in activities to reform the library must balance careful planning, preparation, and commitment with the energy and excitement of redefining library services and achieving dramatic results for library customers.

Like other organizational strategies, ReEngineering, processes, and vision can fail if there is no high-level commitment to change. Change is the most difficult process to facilitate for leaders. Library leaders must be passionate about the direction for their organization; they must reinforce these change efforts each day by "walking the talk"; that is, by practicing what they preach. Leaders must make changes relevant to the daily lives of each staff member, and the new changes must be consistent to the credo - explicit or implicit - and culture of the organization. Leaders must be firmly convinced themselves, and they must be able to convince their parent organization and their staff and customers that they are both honoring the past and creating the future. The new organization must be reconciled with the present and set in reality. At the same time, however, the new organization cannot be an extension of the past; leaders must be trusted, have imagination and an awareness of the surrounding issues, environment, and culture in order to synthesize the proper future course for the organization.

In the abstract and in isolation, no approach is a "silver bullet"; that is a magical solution to an organization's problems. The strategies for change: ReEngineering the library's processes and creation of a vision as a guiding force for the staff, are tools that leaders must use effectively in order to achieve success.

Library leaders must be knowledgeable in the concepts in order to make them concrete for staff and for the larger institution. Education and learning therefore become important for everyone - the library director and all staff, in order to insure that the staff are aware, involved, and energized along with senior management. The prospects for change may be viewed as exciting and ambitious by some and as a threat and nonsense by others. Library leadership should impart the broader perspective and context behind these changes. Leaders should use the vision to impart and confirm the idealism and values of libraries and to excite staff about the end state of the organization once it has solved its problems and transition to the new state.

Leaders should prepare themselves and their staff for the frustrations, confusion, and chaos of getting from here to there. The change process and orientation to the future is not smooth nor fun. It is, however, a fertile and creative time when new ideas and approaches can surface from all parts of the organization. Library leaders must have good listening and integration skills so that new ideas - from all parts of the organization - are heard and integrated into the new structure. The change process must be open and

honest; staff must be prepared to analyze and critique ideas, not people. Leaders must embody and champion imagination and synthesis. Leaders must balance patience, strength, empathy, and commitment in firmly moving the organization forward.

The early process in reforming the organization must be collaborative at the proper levels in the organization. That is, the process should not be strictly top-down, but it should also not be totally inclusive. Leaders must assume their leadership responsibilities; this includes the direction of the change process, structuring of a collaborative, iterative process composed of key members from all levels of the organization, and to keep the process centered on the end vision when it is in danger of being bogged down. One approach is to create a cross-organizational team composed of respected staff members from all parts of the library who are charged with creation of versions of the plan that are then presented to all for participation, clarity, and input. The goal is to negotiate and navigate a path that will bring the staff along with the new plan but which does not become totally defused by absolute consensus.

THE PROCESS APPROACH FOR LIBRARIES: STRATEGIES

As stated in the cautions above, the pain and risk associated with organizational change are clear signals that this endeavor should not be entered whimsically. It is equally clear, however, that the forces of chance are overwhelming. It is important to constantly remind ourselves and our organizations why we are advocates of change: what is our current balance of satisfaction and dissatisfaction? The library leader must trust her/his intuition in divining from all of the environmental and cultural factors the timing for change. Once that decision is made, the leader must move the organization forward with a firm, broad perspective and focus on the future.

As the senior officer in the library, the Library Director will have the best coign of vantage and understanding of the university's strategic directions and which of the university processes are of paramount importance. This environmental and contextual knowledge is critical for effective library organization and leadership; if the library is not in step with its parent organization, it cannot deliver effective service. As the leader of a knowledge management organization, however, the library director must involve all those who can bring expertise to bear on the issues. Today's environ-

ment is not a time for singular heroes or lone pioneers; rather, today is the time to leverage the superiority of the team and group for solutions, ownership, and enduring value.

Strategy 1: University Processes & Library Alignment

This scenario is based upon alignment of the library's vision and organizational restructuring with the processes of the university. If libraries are to determine what they should be doing, and what they can stop doing, then they must understand the functions of their institution.

The processes at work in an institution may vary by degree and by particular initiatives. This may result in the added complexity of integrating the library's processes within multiple layers of institutional processes.

For colleges and universities in the United States, there are three generally accepted missions: Teaching, Research, and Service. To fulfill these missions, seven enduring processes have been identified by Helen Willa Samuels in *Varsity Letters: Documenting Modern Colleges and Universities*.[4] Samuels's work has two purposes: to assist the understanding of higher education institutions generally, and to provide archivists with an approach for documenting institutions that is not based upon organizational structure, but rather is based upon the processes at work in the institution. In her work, Samuels prefers the term "functions" and "functional approach"; her use of those terms and their meaning, however, map to the definition of process given above. In the discussion here, process will be the term used consistently.

Samuels derived the seven processes to assist archivists in making practical decisions regarding determination of archival materials. The processes provide an intellectual and operational map for decision making and provide a greater level of specificity that the higher level three-part mission. Through this identification of the processes, university archives can make informed collection decisions and correlate between their collections and services and the processes that the institution fulfills. Samuels explains:

> "Colleges and Universities are traditionally assigned three missions: teach, conduct research, and provide public service. ... These three traditional mission terms had to be transformed into a group of functions that more accurately described modern colleges and universities. ... the three missions [have been] expanded in the following seven functions:

Confer credentials. Describes the process of recruiting, selecting, and admitting students; providing financial aid and academic advice; and, finally, graduating the students.

Convey knowledge. Covers the formulation and delivery of the curriculum as well as the learning process.

Foster socialization. Includes the informal learning that takes place outside the classroom in a planned and unplanned manner through residential life, extracurricular activities, and personal counseling.

Conduct research. Describes the endeavors of the faculty and graduate students in the search for new knowledge.

Sustain the institution. Covers those areas, including governance, financial and personnel management, and physical plant, that are required to assure the continuity of the institution.

Provide public service. Examines those activities, including technical assistance and continuing education, that are primarily directed to outside communities.

Promote culture. Explores the role of the institution as collector and disseminator of culture through the operation of museums, libraries, and archives." (Samuels, pp. 19 - 22).

The structure of these seven processes offer solid links between library services and the work of the institution. As a library works toward identification of its internal processes, library administrators should remain aware and connected with the larger processes at work in their environment.

For example, traditional collection development activities could begin to question and identify those institutional processes which they serve: Confer Credentials, Convey Knowledge, Conduct Research, Provide Public Service, and Promote Culture. Through these specific linkages, library administrators can make a persuasive case for the value of the library to the institution and to the efficiencies of library resources. Another example could be public service. Through discussions in the library about reference services, librarians may identify several key - and perhaps surprising - institutional processes served beyond the clear linkages to the academic focused processes. Library public services help fulfill the socialization process by nurturing the positive interactions between students, faculty, and staff. Reference services may also serve the Sustain the Institution

167

process through services to university administrators in need of informa-
tion.

The key here is that the library can engage a level of conversation regarding
its support of the institution that provides greater clarity for the library and
demonstrates concretely the value added by library services to the univer-
sity community. The focus of effort should be on the translation of these
high-level, conceptual processes into real, day-to-day direction and ser-
vices for the library.

This approach to foster new perspectives and to encourage this contextual
and linked discussion of library services can energize library staff. Thinking
about services differently can nurture greater flexibility and innovation by
library staff at all levels. For example, encouraging a circulation desk
manager to think about and act on the role of circulation in the university
process setting: Convey Knowledge, Foster Socialization, Provide Public
Service, could lead to greater confidence and new services that were
previously ignored.

Strategy 2: University Process ReEngineering and the Library

Some institutions have begun to re-think their administrative processes
with the goal of dramatic improvement and efficiencies in support of the
university mission. In this scenario, a library would be challenged to
respond nimbly to the information needs of the business process reengineers
and to align itself in support of the institution's near term priorities.

In 1993, MIT began an extensive and intensive ReEngineering effort to
improve its administrative processes. The ReEngineering teams began by
identifying five basic processes that were appropriate for a large-scale
ReEngineering effort. This is the news office announcement of the pro-
cesses and what they include:

"Team Identifies Five Processes: Reengineering Team Identifies 'Proc-
esses' for Further Look." *Tech Talk*, April 4, 1994.

Subtitle: Five key MIT "business processes" have been selected for closer
review by the ReEngineering Core Team.

"Professor James D. Bruce, program manager of the ReEngineering
effort, identified and described the five processes as:

Student support: the collection of administrative functions performed for students from arrival on campus to graduation, including registration for subjects, recording grades, administering financial aid, placement, support by the Office of the Dean for Undergraduate Education and Student Affairs, etc.

Research acquisition: those functions performed between the identification of a research opportunity and receipt of an awarded grant or contract.

Laboratory operations: functions that support the operation of a laboratory, including plant and operations; worker health and safety; regulatory oversight; research services such as animal care, radiation protection and environmental medicine; and equipment maintenance.

Management reporting: this process focuses on the provision of reports that are necessary to manage one of the Institute's departments, laboratories, centers or administrative units.

Buying and paying for supplies: this process focuses on the functions involved in acquiring a product or a service for use at the Institute and reaches from the determination of need by an individual or project to accounting paying the bill."[5]

In this strategy, the library would be responding to near-term institutional priorities by focusing its information collection, management, and distribution expertise and resources on the ReEngineering efforts. The immediate linkage is to support the work of the university administration. It is wrong to assume, however, that these ReEngineering efforts do not impact the academic programs. Reengineering of administrative processes is intended to increase the effectiveness of university administration in order to devote more resources to the academic, research, and student support activities that are at the heart of the institution. As a partner in this near-term organizational mission, the libraries could demonstrate collaborative and responsive behavior. Libraries are in fact both academic and administrative entities; they can serve as one of the strongest connections on campus between the academic programs and the administrative activities in support of those programs. For example, the libraries' business and economic collections and services could provide reference services and data required for the business analysis of the ReEngineering teams.

This strategy differs from the first because here the library is responding to an explicit reorganization effort by its parent institution. In this scenario,

169

there may be no direct influence for the library to reorganize; however, as a learning organization, there may be knowledge and activities from the ReEngineering activities that the library could in turn apply to itself.

The leadership and administrative challenge for the library is to understand and participate in these institutional priorities and to gain a seat for the library at the university table. The library can leverage its professional skills in order to lead rather than respond to the community and to shape the university rather than reflect it.

Strategy 3: Knowledge Work Defines the Library Processes; the Library as Champion for Knowledge Work in the University

In the two strategies above, the library is acting from a set of strategic priorities established for the university. A larger, global, and asset rich process is knowledge work, and libraries are the premier examples of knowledge management and knowledge workers. In this strategy, libraries can seize an active role in change leadership by leveraging the core skills of the organization as a model for the university. Librarians can lead the way in transforming higher education through a new orientation of teaching, learning, and research as components of the meta-environment of knowledge work. First, we must ask the question: What is meant by knowledge work process and what is this new challenge that defines our transition into the new century?

In 1978, Peter Drucker wrote, "To make knowledge work productive will be the great management task of this century, just as to make manual work productive was the great management task of the last century." (Davenport, p. 53). Libraries have a historical grounding in knowledge work and over time have worked to make the operation and service of knowledge as productive as possible. Today, however, with the network as the new mode of communication and distribution and the use of digital technology to create new knowledge, libraries must now compete with other information providers who lack the fundamental grounding of libraries and librarians.

If, then, knowledge management skills are the challenge for the next century, what is it? Davenport writes: "What is Knowledge Work? In our definition, knowledge work's primary activity is the acquisition, creation, packaging, or application of knowledge. Characterized by variety and exception rather than routine, it is performed by professional or technical workers with a high level of skill and expertise. Knowledge work processes

include such activities as research and product development, advertising, education, and professional services like law, accounting, and consulting." (Davenport, p. 57).

The key professional service Davenport omits is Librarianship. Librarians professional training orients them to the product - knowledge. As Davenport has defined knowledge work, then a university's success will be increasingly dependent on the skills of its knowledge workers. "More of an organization's core competencies will center around managing knowledge and knowledge workers." (Davenport, p. 57).

Davenport proceeds to characterize the orientation of these workers to knowledge. "We distinguished five different primary orientations to knowledge:

1. Some processes consisted of **finding** existing knowledge - understanding knowledge requirements, searching for it among multiple sources, and passing along to the requester or user.

2. Other processes involved **creating** new knowledge. Examples are the research activities in a pharmaceutical firm and the creative processes in advertising, writing books or articles, or developing a movie.

3. Knowledge work processes can **package** or assemble knowledge created externally to the process. Publishing is a prime example of knowledge packaging. Even though it does not create new knowledge, the editing, design, and proofing processes qualify as knowledge work.

4. Certain processes **apply** or use existing knowledge. In these processes, the creation of new bodies of knowledge might be actively discouraged. For example, in the redesign of an auditing process, the auditor was expected not to create new knowledge about financial reporting but to interpret and apply existing procedures to a company's financial transactions.

5. Some firms have primary focus on the **reuse** of knowledge. They promote learning but focus on separating it from prior knowledge and leveraging that prior knowledge as much as possible." (Davenport, p. 57)

There is no other profession which embodies these five orientations better than librarians. If we follow the global trends toward intellectual capital as the critical asset for nations, then we must also allow the critical role of librarians in framing a nation's knowledge work and structures.

171

On a university level, libraries have an opportunity to work collaboratively with academic colleagues to energize and accelerate knowledge work in the classroom, laboratory, and locally and remotely.

Using the client/server technology architecture as an analog, library collections - in all formats - are the server stores for knowledge, and those stores are the product of the organizational skills of knowledge workers - librarians. With these stores of information, knowledge workers seek to supersede those organized stores with new knowledge. Librarians can begin to assume a greater role on the client end of the relationship - working collaboratively with the information user in the user's environment, not in the library. If knowledge work is primarily a social relationship, then librarians' play a key role in the successful formulation of that relationship and the ultimate success of the knowledge work. Information users no longer seek the library automatically; in the competitive landscape of knowledge work, librarians and libraries must meet the user in the setting most comfortable for the user. In addition, the librarian must possess the relationship skills to meet the specialized, individual needs of knowledge work while also leveraging the information infrastructure to provide these unique services to a very large audience. Librarians must understand when they can be most effective as intermediaries and when to step out of the relationship and enable the user and the information interact directly.

Strategies Summary:

There are common themes that emerge in considering the role of the library and librarians in each of these three strategies. These behaviors are important assessment measures as a library considers entry into process-centered activities within its organization and with its institution.

Awareness and connections. These are two attributes for creativity that enables change in the university. The Library best serves and is best served when it is knowledgeable about its environment and when it has analyzed what it does well and what it needs others to do well for it.

Interdependencies. Intellectually, the university has never been a hierarchy. As disciplines have evolved, they have organized themselves in the university more as a confederation of related bodies of knowledge and intellectual endeavor. Recently, disciplinary boundaries have become more permeable, and the classification of knowledge has begun to break the old structures of academic departments or library classification. Simi-

larly, the library organization is no longer able to sustain its array of services wholly within itself. Libraries and all units of the university must become vested in the success of its colleague units in order for its programs to succeed.

Integration. As the center of the university, the library cannot remain static - even with this key status. Rather, the library must be able to extend itself - conceptually and through services - from this center to the most distant boundaries of the university. In an information rich society, the library cannot assume that those who are using or creating intellectual capital will automatically think of the library. The intellectual community will extend beyond all physical, political, and organizational boundaries, and the library should be integrated into the intellectual community and not into the organizational entity.

Relationships. Libraries will be most successful if they are active in building and sustaining relationships. As services and technologies undergo rapid change, relationships will endure. Libraries need relationships with their service providing partners, especially information technology units, and with all permutations of users - individuals, groups, local, remote, co-located, networked, etc.

Education. Librarians must be supported in a continuous mode of learning across several dimensions: knowledge content, social relationships, management, and measurement.

ACTION ITEMS: GETTING FROM HERE TO THERE

Along these dimensions for change in the academic library, higher education, and the global knowledge environment, what can library leaders engage to nurture success in this new world? There are specific initiatives available to an academic library on two levels: strategic and tactical.

Strategic initiative: The library must have a vision

For knowledge workers such as librarians, a vision is a navigational and decision-making aid that enables them to act within a flexible environment. A vision enables the management strategy of pushing down priority setting and decision-making to the level of those professional staff who have an intimate knowledge of the issue and activities. A vision for knowledge workers must be created in participative manner, and it must be re-confirmed each day by senior management.

An organizational effort to form a vision is an early step in organizational alignment. A library, for example, should be aware of the vision of its university, and the library should construct its vision so that it fulfills the promise of the larger environment.

Within the Library, a vision can be used in re-shaping the organization to benefit the organization in the five ways given in Lipton's definition at the beginning of this paper. (Lipton p. 84-85).

In creating a vision for the library, it is imperative to involve the staff in a highly participative manner for each sphere of the vision: strategy, mission, and culture. Buy-in, ownership, and utilization are more realistic when knowledge workers are involved in the activity and the product.

When we consider the combined organizational power of a clear vision, process-orientation, and knowledge work, we can begin to understand the framework components available to library leadership to re-shape the library. This robust environment for facilitating change can be further augmented by deeper, tactical efforts.

Re-THINKING the work

Organizations often find a difficult transition from high-level, strategic advice: mission, vision, and culture to day-to-day, practical advice. Academic libraries especially may find it difficult to think differently about their services and organizations at an organizational level. Librarians are often eager to re-think their work, but are hampered by the diurnal duties that occupy all available resources. Davenport and others offer some thoughts to help the transition from a high-altitude, conceptual view to a ground-level practical implementation.

Davenport suggests activities to improve knowledge work processes; these are efforts within the library designed to position the organization and staff for full participation in the professional aspects of their work.

First, Davenport suggests "freeing knowledge workers to do knowledge work by reducing their administrative tasks". Today, librarians are inhibited from efficient use of their professional skills by the costly overhead of non-professional administrative duties. Through better utilization of enabling technologies, outsourcing of specific administrative duties, better utilization of university services to provide administrative support, the library can begin to recoup professional resources and effort and direct those savings to greater services and outreach.

Second, Davenport recommends "making an implicit knowledge process explicit and consistent". The time has long past when mystery is a strategy to ensure continuing support. An example here would be cataloging. Rather than describing catalog activities as "bibliographic control" which is not meaningful to users, libraries can become more explicit in explaining activities in terms that the user can understand: organizing knowledge, providing consistent access to information. In this explicit and clear description of the activity to outside customers, librarians can also use this exercise to extrapolate the real competency at work. In cataloging, the competency is organizing information. This skill is critically important in almost all areas of scholarship. Librarians could begin to share their skills and knowledge in order to improve the effectiveness of the entire academic enterprise. Through this process of explicit and clear description of library activities to the user (and the university administration), libraries can begin to educate those relationships about the complexities of knowledge work, about the demand that users place on the libraries, and to encourage participation - either in support or addition of more resources to make that work yet more efficient.

Finally, Davenport reminds organizations that they must "add knowledge to a process that delivers value to the customer". This is an obvious service provided by libraries. It remains true, however, that many users cannot clearly distinguish the information services distinction between a library and, say, a bookstore. As part of the educational effort for the librarian and the customer, recognition of the libraries' added value should be an important goal. If the library cannot demonstrate value beyond a book-store, then the question must be raised - why have a library? Similarly, what are the knowledge and skills that distinguish a librarian from a non-professional?

There are many techniques available to librarians to accomplish these three recommendations. Involve the customer in the process to increase satisfaction with results. Libraries have a long tradition of the reference interview - a specialized technique to understand the real question (rather than the question posed) and to understand the needs of the users. Other techniques are focus groups, interviews, surveys, etc.

Libraries must improve and accelerate information sharing within the organization. In the information chain, how do collections/acquisition processes inform the public service process of changes, bottlenecks, and new opportunities? In a diverse, information-rich environment, librarians

175

can assume a greater role for sharing information. Libraries should analyze how information is shared within the organization and with library users. What are effective tools - e-mail? bulletin boards? web pages? in-person visits? How do librarians choose the right communication/sharing tool for the proper purpose? Clearly, e-mail is appropriate for some categories of information distribution and anathema for others.

Librarians must become more adept at getting the work out and improving the implementation of programs and initiatives. Libraries are very good at forming committees and task forces to solve problems. The good news is that these groups are usually composed of the right set of skills and people. The bad news is that libraries are not good at project management and completing the work. Often, ideas and initiatives take too long for action, and the particular issue is overtaken by events. For example, many libraries began to work on Gopher models for networked information distribution, only to find that their carefully crafted approach was rendered immaterial by the World Wide Web. Project management means efficient completion of well-defined work by a team that is focused and aligned with the task. Projects have a beginning and ending date, and the project team is expected to focus intently on that issue and to complete its work at a level of expertise sufficient to solve the problem. Perfection is not the goal, productivity and service are the success measures.

Re-DESIGNING the work: tactical approaches

Realistically, what can libraries change about their work? How would a library really change its approach to library collections and services. In his analysis of corporate knowledge work, Davenport has identified three things that can lead to real change. Some of these may be more realistic for libraries. Davenport suggests that organizations can work more productively with the information itself. (Davenport, p. 61 ff.).

Firms can **change knowledge** itself by reducing (or, in some cases, creating) a unit of knowledge that workers can reuse or access or by improving knowledge capture techniques. Companies often want to make knowledge more portable, modular, accessible, and recordable; in short, they attempt to make knowledge easier to manage as a discrete object.

Libraries can begin to treat collections/acquisitions less like books and journals and more like information objects, including electronic data. Collections staff may begin to think of the collection as a distributed entity,

not as one cohesive amalgam of materials on shelves in a location. Information may become more a factor of relationships than a factor of purchase or acquisition.

Next, Davenport states that firms can improve knowledge work by changing the physical location of **where and with whom people work.** This change typically involves collocation, new or modified team structures, or new roles. Frequently, the simple step of putting people together to work in the same room greatly enhances knowledge work effectiveness. In information systems development processes, significant gains have been achieved when IS professionals have worked side by side with users. Davenport suggests re-thinking the physical location of knowledge workers. If the first suggestion - rethinking knowledge units - is feasible, then this would suggest changes in the location of library staff. Perhaps greater technology skills are needed in distributed work areas, and information policy experts may need to be working in the circulation and collection development areas in order to insure that the library is getting value on its investments and conforming to the institution's policies regarding information access, use, and privacy.

Libraries are possibly the best example of Davenport's third point: "Firms can **use technology to bolster knowledge work** by, among other things, creating knowledge bases, enabling telecommunications, infrastructure, and applications. Because they heavily influence process flow, technology changes are more consistent with ReEngineering-oriented approaches to knowledge work, and most of the projects in which we found them were being done in that context. As organizations, libraries have been leaders in squeezing the manual work out of the organization through the use of technology. In addition, libraries have been leaders in combining technology and collaborative inter-organizational programs, such as OCLC, consortia, ILL, etc. The new challenges for libraries in the internet world of open communications is to expand those approaches to a larger sphere of partners beyond library-to-library or library-to-vendor.

Re-THINKING and Re-DESIGNING: A tool to facilitate action

In the conclusion to his article, Davenport offers a simple matrix tool that can assist organizations in their approach to knowledge work processes. Through discussion, information gathering, and analysis, libraries can begin to pinpoint key pressure areas in need of re-design and that can offer

177

significant gains through changing the knowledge work process. This matrix may also help a library identify priority work that can demonstrate success quickly, or, to identify difficult areas or work that require greater resources and time.

Davenport's Matrix : Relationships between Knowledge Orientation and Design Strategies (Davenport, p.64).

	Changing the unit of knowledge	Changing where and with whom people work	Employing technological enablers
Find Knowledge			
Create Knowledge			
Package and assemble knowledge			
Apply knowledge			
Reuse knowledge			

For example, if the orientation to Package and Assemble Knowledge intersects with Where and With Whom People Work, then one could imagine a unit that is composed of cataloger's, outreach librarians, publications staff, web experts, and design experts.

CONCLUSION

The current and future world for academic libraries is one of constant change and challenge. This paper confirms that librarians have a critically important role as expert knowledge workers in higher education. Library leaders can benefit from an awareness of the overarching forces at work in higher education, a knowledge and familiarity with value-adding management approaches, and an ability to utilize those tools and techniques which fit the needs of the organization. There is no one organizational orthodoxy that is satisfactory for the diverse, complicated work of the academic

library. There are, however, a variety of approaches that, when combined, can become very powerful change agents for the library. The role of the library director is to identify those approaches which best fit the unique personality of that library and that academic institution. Among the approaches described here are Organizational Alignment, Vision, and Knowledge Work. The library director in the next century must be able to energize, mobilize, and involve staff toward a vision that is consonant with the higher education goals of the parent organization.

References

1. DAVENPORT, Thomas H., JARVENPAA, Sirkka L. and BEERS, Michael C. Improving Knowledge Work Processes. *Sloan Management Review*, Summer 1996. p. 58.

2. HAMMER, Michael. Succeeding at Reengineering, or In the footsteps of Leonid Kravchuk. Presentation to IT Administration, November 23, 1993.

3. LIPTON, Mark. Demystifying the Development of an Organizational Vision. *Sloan Management Review*, Summer 1996, p. 85.

4. SAMUELS, Helen Willa. *Varsity Letters: Documenting Modern Colleges and Universities*. Chicago, The Society of American Archivists et al., 1992.

5. DI IORIO, Robert C., MIT News Office. Team Identifies Five Processes: Reengineering Team Identifies 'Processes' for Further Look. *Tech Talk*, April 4, 1994.

179

Challenges of Digital Information for Research Libraries

Sul H. Lee
University of Oklahoma, Norman, Oklahoma, USA

Sul H. Lee has a B.A. in Political Science from Bowling Green State University, an M.A. in International Law from the University of Toledo, and an M.A. in Library Science from the University of Michigan. During his long professional career he worked in several universities. Since 1978 he is Dean, University Libraries, Professor of Bibliography and Professor of Library and Information Sciences, the University of Oklahoma, Norman, Oklahoma. He is the editor of numerous books and of the <u>Journal of Library Administration</u> and the <u>Journal of Collection Management</u>, has far-reaching consulting experience and is active in different professional organizations.

Abstract

Advances in the capability to convert information from print forms to digital formats is offering libraries some relief from traditional library problems of rising publication costs. Digital information also preserves traditional print forms and increases accessibility to selected data sources. Advantages of digital information are offset, however, by initial hardware and software costs, the need to continually update equipment and software, and the lack of organization of Internet resources. While research libraries may be helped by the rapidly developing digital information resources, technology costs often equal or exceed those associated with print formats. Research libraries are in a transitional phase in which electronic resources are supplementing, not replacing traditional print forms.

The ability to transfer information from a print-on-paper or microform format to electronic impulses captured on a disc or magnetic tape offers librarians an array of new options for preservation, acquisition, and service to researchers. Yet, many of our colleagues feel they labor in a transitional period. To this group, electronic information sources appear as solutions to some traditional library problems, but each technological advance brings a host of uncertainties with it.

If we look backward we find that the personal computer (PC) played a large role in revolutionizing access to information. Reduced costs and increased disc storage capacity have made the personal computer readily available and immeasurably useful for a variety of tasks. The PC, the compact disc, and the Internet have combined to remove the traditional limitations of space and time for both librarians and library users.

These electronic resources provide new opportunities for preservation, and increase access to resources not held. Digitizing preserves data and, at the same time, makes it accessible to those who do not own it. Libraries no longer need to own a book or journal for others to read them. One does not even have to go to the library. Equally significant is access to materials that were once too fragile to handle. Conversion of printed texts to digital formats by scanning provides new opportunities for making available fragile or rare materials. The potential to some seems unlimited. Some even claim that the capacity to digitize information and its potential for resource sharing is a solution for the longstanding impoverishment of the research library's acquisition programs.[1]

Digital technology is, indeed, offering answers in some areas. In other areas, the gains are marginal and there are good reasons to reserve our optimism. It is this need to examine closely the possibilities and potential of digital information that puts research libraries at a crossroads.[6] In the remainder of this paper I want to look at some of the pluses and minuses of this remarkable wave of technology. Let us examine some of the gains first.

One of the most beneficial digital products is a forerunner that has been with us now since the late 1960s. I refer to the electronic catalog record as it exists in the Online Computer Library Center (OCLC) and Research Library Information Network (RLIN) bibliographic databases. Developed initially as a way to share cataloging costs, the bibliographic utilities also

provided the databases for the online catalogs now so prevalent in research libraries and so easily accessible from remote sites.

Expanding from catalogs of library holdings, the Online Computer Library Center (OCLC), the Research Libraries Group (RLG), and Colorado Area Research Libraries (CARL) have developed indexes to bibliographic citations and, more recently, access to full-text information. Libraries may now provide access to information about their holdings and also offer information about materials they do not have in their collections. In addition, these libraries may quickly obtain these materials through electronic transmission. The services available include OCLC's FirstSearch, RLG's Eureka and CARL's Uncover.

Such services are changing the way libraries do business. Libraries, for instance, no longer need to focus totally on acquiring materials for their own collections. Library strategies now include direct electronic access to information and materials provided by other suppliers on an "as needed" basis. This is a new frontier for librarians, one which should be explored cautiously. While electronic access is a powerful tool and gives libraries new options for serving their users, it should not be considered the panacea for all library problems. Research libraries in the United States have long held the philosophy that they are committed to collecting knowledge for future as well as current generations. The accumulated knowledge of humankind, whether in electronic or other formats, still must be collected for posterity and the libraries are the appropriate institutions to do so.

I also wish to note the widely accepted use of CD-ROMs in United States libraries. The format is used to store and access large reference files such as Dissertation Abstracts and subject databases such as ABI/Inform, PsychLit, and Sociofile. One may also find complete encyclopedias with text and images "published" in CD-ROM format. One of the most exciting technological aspects of the CD-ROM is its ability to support multimedia presentations. With the appropriate software, a CD-ROM encyclopedia such as Microsoft's Encarta will provide the student with text, sound, and full-motion video information on the topic under investigation. This technology, combined with the ability to network CD-ROMs, creates the option of providing information to local users in the traditional library as well as researchers in their offices, homes, or other remote sites.

Perhaps nothing has caught the attention of libraries as much as the Internet during the past five years. With Internet connections and related

software we can access libraries and contact people almost anywhere in the world. Of particular importance to libraries is the great impact the Internet has made upon library resource sharing. The ability to quickly, and at low cost, transmit information between libraries has benefited interlibrary loan service and the collection development process. Software programs such as Ariel, developed by the staff at RLG, allow libraries to scan information and transmit it via the Internet. What used to take days to deliver by surface mail now takes minutes to receive over the Internet.

Major United States companies including University Microfilms Incorporated in Ann Arbor, Michigan; EBSCO Information Services of Birmingham, Alabama; Information Access Company of Foster City, California; and the CARL Company of Denver, Colorado, offer document delivery services utilizing the Internet. Researchers can review indexed databases for needed resources and request their delivery at the same time. The materials are electronically transmitted and the requester is billed for the service. Each vendor offers a slightly different service with variations of documents, search engines, and billing policies. But, taken together, they offer a fast, effective option for delivery of information.

Another important aspect of digital technology is its ability to preserve and make available scarce, one-of-a-kind materials such as unpublished manuscripts and photographs to multiple libraries without risking loss or damage during physical transfer of the materials. The Library of Congress' American Memory Project, developed between 1990 and 1994, is an excellent example of how digitization can promote access to documents. The project, funded by the U.S. Congress, selected primary source materials including documents, art and photographs, and sound recordings that represent pivotal events in United States history and converted them to digital format. The goal of the project was to bring these historical resources held only at the Library of Congress to a wider audience so that more people would be aware of the nation's history. In October, 1994, the Library of Congress announced the National Digital Library Program, an expansion of the work begun in the American Memory Project. The National Digital Library Program is a cooperative public-private partnership to make more of the nation's historical treasures available to Americans. Special collections from many areas of the country are expected to be "digitized" and made available.[5]

The capacity to digitize information is in itself a potentially effective preservation tool. The development of the low-cost scanners that literally

183

produce bitmaps of documents has overcome the recognition problems inherent in Optical Character Recognition (OCR) scanning. Digital preservation brings some remarkable advantages not previously available. It offers, for example, the ability to manipulate and enhance images in ways that current reproductive processes cannot. Stains on documents, underlining on pages, and ink bleed-through can be removed. Photographic images can be cropped and color tones and shades enhanced. Digitizing allows a preview of the finished product before a document is saved. Digital formats also offer flexibility in presentation. That is, digitized data may be transferred, with ease, to paper, microform, or screen display.[4]

All of these potential uses seem beneficial on the surface and, indeed, already have been used successfully in research libraries. Unfortunately, there are negative factors associated with each that librarians must consider before assuming that the traditional problems of space, time, acquisition budgets, and access are solved. Consider, for example, that while electronic resources are growing, we in the library world are only too aware that the production of books and scholarly journals in print also continues to increase. At the same time, libraries' capacity to maintain current acquisitions and subscriptions of printed materials continues to decline. More and more libraries are deferring purchases of key printed materials in the hopes that others will buy them and the materials will be accessible through interlibrary loan or facsimile delivery. To date, digital information resources have not noticeably decreased the number of materials being produced in printed formats. Until there is a leveling and subsequent decline in published materials, librarians cannot realistically say that electronic resources are replacing the traditional printed book or serial.[7]

Consider also the real costs of digital information. Initial outlays for hardware and software are major expenses that must be absorbed into budgets that are already too small. Add to these start-up costs the costs for constant upgrades of hardware, and more significant, enhancements to software. One of the characteristics of electronic data is that it needs to be "refreshed" with each change in hardware or software. If not done it soon becomes inaccessible. A third major expense is salaries for specialists and training of existing staff. Research libraries that install electronic resources, even those as commonplace as online catalogs, often find they need in-house programmers and support technicians. Then, too, the librarians on staff must be trained to give researchers the best help available or electronic resources are not used to their capacity.[6]

Some libraries have succeeded in receiving special one-time funds for purchase of hardware and software to support electronic information resources. While these situations may be adequate for start-up, the library is frequently left to its own devices for the ongoing costs associated with access to electronic information. Unless they are able to increase the base budget, these lines must be created from existing ones. With increasing frequency, budget lines supporting electronic library resources come from traditional acquisitions and operations sources. That is, the costs for fee-based databases, computer hardware, CD-ROMs, and dedicated line charges may be paid for from funds set aside for acquisitions, usually monographs. Some research libraries are now spending from eight to fourteen percent of their budgets on digital information resources. This has a doubling effect when we consider that acquisition budgets are already inadequate and these same libraries are deferring purchase of key materials.[6,7]

Copyright laws will inhibit many contemporary publications from being converted into digital formats. As producers of electronic resources limit their products to works in the public domain, they leave an overwhelming amount of information unavailable in electronic formats. Traditional publishers cannot be expected to give up their copyright protection. Consequently, libraries can expect to continue acquiring copyrighted materials in print format; to pay licensing fees to access copyrighted materials in electronic formats; or to buy a paper version of some publications also available in digital formats. In any copyright scenario that is presented, the research library will probably have to sustain traditional print costs to obtain the same materials in electronic formats or pay exorbitant fees for the electronic product only.[6]

Another factor limiting the desirability of digital information is the selectivity involved in choosing what is made available in digital formats. The process of converting textual information into digital formats is expensive. It requires specialized equipment and is very labor intensive. Only a small percentage of available textual materials is worthy of the conversion expense.[2]

Perhaps a more formidable obstacle is the lack of standards for production and the uncertainty of product life for digital publications. We currently do not know how long digital format products (discs) will last or how long the

185

digital impulses will remain readable. Again, rapid hardware and software obsolescence quickly render earlier products unreadable. Each change means that data in digital formats need to be refreshed. Closely allied to this problem is the ease with which digital data may be altered without leaving any evidence of the alterations. While the capacity to manipulate and enhance data during digital conversion may be useful for capturing and reproducing certain media such as photographs or manuscript documents, it can also be a threat to the intellectual integrity of information. Digitized information is subject to three types of alteration: accidental; intentional, well meant; and intentional, fraudulent. While "hashing" and digital time-stamping are potential solutions to the possibility of data alteration, providers of digital information are not yet able to guarantee the integrity of the information they supply.[3]

My conclusion to this review of digital information sources may be summarized by saying that research libraries are in a transitional stage. Technological advances have produced a tension between the traditional research library and its electronic counterpart of the future. Economic factors related to the acquisition role and the ability to provide service and information will probably determine how libraries develop in the short term. Currently, electronic information resources are an important and significant addition to a library's holdings, but the electronic library has not, and will not soon replace the traditional research library. Electronic sources do offer some relief by providing remote access, but the cost of these sources is also high. The Internet, with its lack of direct costs to libraries, and its capability to transcend time and distance is a phenomenal resource for research libraries. I cannot visualize major research libraries without Internet access for its patrons. At the same time, the Internet lacks the organization of its resources which are so essential to researchers. Until better organization of Internet resources is available, it cannot be looked upon as a permanent replacement for collections held.

Electronic resources are, without doubt, an important source of information for research libraries. They should be viewed, presently, as a supplement to traditional collections, not their replacement. While the electronic library has not replaced the print library, we can expect that digital information will evolve in ways that it will become less expensive, more abundant, and more prevalent in all libraries.

References

1.   CAMPBELL, Jerry D. Building Xanadu: creating the new library paradise. In: Chiang, Win-shin S. and Elkington, Nancy E., eds. *Electronic access to information: a new service paradigm.* Mountain View, California, 1994. pp. 25-32.

2.   ERWAY, Ricky L. Options for digitizing visual materials. In: McClung, Patricia A., ed. *RLG digital image access project.* Mountain View, California, 1996. pp. 21-29.

3.   GRAHAM, Peter S. Long-term intellectual preservation. In: Elkington, Nancy E., ed. *Digital Imaging Technology for Preservation.* Mountain View, California, 1995. pp. 41-57.

4.   KENNEY, Anne R. and CONWAY, Paul. From analog to digital: extending the preservation tool kit. In: Elkington, Nancy E., ed. *Digital imaging technology for preservation.* Mountain View, California, 1995. pp. 11-24.

5.   LAMOLINARA, Guy. Linking the nation's libraries: Ameritech's partnership with the Library of Congress. *Interchange*, 2, (1), pp. 5-9, 1996.

6.   LYNDEN, Frederick C. Tradeoffs or not: the pros and cons of the electronic library. *Collection Management*, 21, (1), pp. 65-92, 1996.

7.   LYNDEN, Frederick C. Will electronic information finally result in real resource sharing? A paper presented at the conference on the Emerging Pattern of Collection Development in Expanding Resource Sharing, Electronic Information and Network Environment, University of Oklahoma, Norman, Oklahoma, February 22, 1996. 24p.

187

How Technology May Help or Hinder the Development of the Digital Library

Frank B. Oliver

Frank Oliver Associates Ltd., Kingswood, United Kingdom
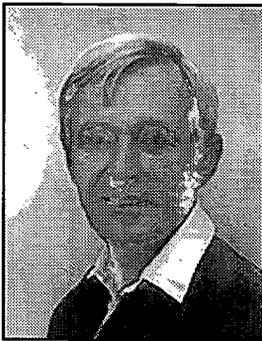
Frank Oliver is an independent IT management consultant who has worked for the British Library for eighteen months and more recently for Dataware Technologies (UK) Ltd. Prior to forming his own company Mr. Oliver was employed by Shell Research as Head of Information Management. He holds an honours degree, is an Associate Fellow of the Institute of Mathematics and Member of the British Computer Society.

Abstract

The provision of a world-wide library will require the creation of global digital libraries. During the last ten years computing and communications technologies have developed to the point where it appears that the dream of making the world's collection of information available to all the people of the world may one day become reality. Today's technology has enabled a very modest start to be made on turning that dream into reality. Yet this very technology is enabling new information to be generated in unprecedented volumes in a form that, for the first time in history requires the application of sophisticated technology to translate it into a form that can be understood by human beings. Literacy is not enough and this alone poses major risks and challenges.

This paper will review what key technologies will be required to develop the world-wide library, the lessons learnt to date and how well current projections match the requirements.

1. Foreword

From the ice age to the IC age - From the visible to the invisible

From the dawn of human creation man has communicated via visible symbols. Initially these were pictorial representations of his surroundings which evolved into a primitive alphabet. Clay tablets have survived for several thousand years. Recording information must have been a time consuming activity and long term storage required a lot of physical space not to mention muscle power to file and retrieve. Distribution was very limited but at least the medium did not deteriorate very rapidly - unless dropped, struck by an earthquake or deliberately destroyed!

Papyrus offered greater flexibility, was lighter to handle and therefore distribute. It is said that the first Egyptian library contained 20,000 papyrus scrolls by 1250 B.C. A thousand years later the Library in Alexandria was said to hold 700,000 manuscripts.

Parchment, made, it is believed, initially in Pergamun in 250 B.C. offered similar advantages but required a lot of sheep skins for each publication.

Paper and ink clearly offered significant advantages, it was much lighter and easier to work. Correction was much easier when you did not have to use a hammer and chisel and long term storage and retrieval simplified - but like papyrus and parchment was rather more susceptible to damage or destruction.

The advent of the printing press in the mid fifteenth century enabled the mass reproduction of information, but crucially the medium itself, ink on paper, did not change. It had the advantages and disadvantages it always had except that with many copies in existence information could be disseminated to a much larger audience much more quickly, and the destruction of one copy did not represent an irreplaceable loss to humanity.

The telegraph and telegram communicated information in electronic form but still produced a tangible, visible end product. It was not until the last few years that the medium itself changed to something that is invisible and intangible. We now rely on technology to interpret and present information

189

in a form that we as human beings can understand. For the first time being literate is not enough.

During the last twenty five years we have become increasingly dependent on enabling technologies for much of the information that is produced today.

2. Looking Back

During the nineteen seventies most organisations were reliant on central-ised mainframe and/or mini computers but by the end of the decade micro processor development had reached the stage where the Personal Compu-ter (PC) could become a reality.

Computers were generally used as the 'means to an end', frequently as an aid to creating paper records but the potential existed for greater things. Shell Research, who I was working for at the time, kept the magnetic tapes generated in its central word-processing unit with the intention of creating an 'electronic warehouse' of formal research reports, until the equipment they were created on became obsolete. We justified the destruction of these tapes on the basis of having the paper version of the report. It was the era when voice telephone lines were used to carry data via acoustic couplers.

The nineteen eighties was the decade of the Personal Computer which saw the PC grow from humble beginnings to threaten the centralised computing philosophy.

Optical disc storage appeared as an alternative to magnetic disc and tape for long term retention. For the first time computers appeared in the home and in schools. The relationship between the end-user and staff working in their data processing centres was to change for ever. Desktop publishing packages appeared and revolutionised the publishing world.

It was also the decade when the archive at Shell Research received its first report to be produced on video. This 'document', for want of a better term was a formal record of research carried out. There was no paper equivalent and one could not be created because the report relied totally on the power of video technology to convey the message. For us the problem was obvious - how to keep this 'document' in a form that could be read by generations to come. At that point we faced the prospect of not just maintaining a far more volatile medium than paper but the necessity to maintain equipment suitable to read it in perpetuity. The prospect was, and remains, daunting.

So far as I know that video still exists. Whether it has deteriorated or been re-recorded, or whether its original recording standard is obsolete, I know not.

The nineteen nineties has been the decade of the Internet with millions of people world-wide being able to share information. It has also seen hardware and software developments at breathtaking speed.

It is sobering to reflect that in 1990 a typical PC had a 386 (16 bit) processor that ran at 33 MHz with 4 megabytes of memory and a 20 megabyte hard disc and separate CD-ROM drive.

The laptop I am using today has a 120 MHz Pentium (32 bit) processor with 16 megabytes of storage, 1.2 gigabytes of hard disc storage, CD-ROM drive and twin audio speakers built in. It is 3 months old and already obsolete.

Personal Computers and their peripherals have become a commodity just like bread and jam, and are threatening the very existence of computing companies that have dominated the last twenty five years.

3. Looking Forward

3.1 What would we like to do?

But what of the future, in particular the next ten years, and the development of a world-wide library. Key objectives of a world-wide library are, I suggest:

- to improve access to existing and future collections, particularly by the end-user;
- to utilise technology in the preservation of collections;
- to preserve the integrity of material held only in electronic form;
- to exploit collections for financial reward.

That being so, there will be a need to progressively digitise existing collections and to preserve information currently held in electronic form so that it can be exploited in that form.

There are, of course, many projects currently underway in libraries and by publishers throughout the world to do just that but today's technology only allows fairly modest amounts of material to be processed.

In general, parts of collections of particular note to scholars are being addressed. The British Library in its 'Initiatives for Access' programme has made, for example, the Magna Carta and the thousand year old manuscript

191

of Beowulf's epic combats with dragons and monsters, available on the Internet via its world-wide Web server.

The Library of Congress is planning an ambitious programme to digitise millions of publications concerned with the USA. However, these initiatives represent but a fraction of the major collections of the world.

What might the World-Wide Library (WWL) look like?

The world-wide library of the future may be a vast network of interconnected digital libraries throughout the world with universal access to all, where the costs do not prohibit the people of the developing world from playing their full part. Some of the key features would include the ability to locate relevant information easily, rapidly and securely and at low unit cost. Within ten years there may be virtual libraries with the look and feel of a traditional library but without the need to leave the home or workplace.

What are the key technologies that will be needed to achieve these requirements?

Each digital library will require huge quantities of electronic storage to hold the material. This in turn will require significantly more powerful processors than those that are available today, to locate and retrieve information. Very rapid, cheap and reliable communications and a new generation of search engines will also be essential and scanning technology will need to be improved.

3.2 What technology might be around in the next ten years?

What are the prospects in these key technology areas?

3.2.1 Hardware

3.2.1.1 Hardware - Processor speed

The ability of manufacturers to fabricate ever more densely packed processors has been impressive. In the last ten years a twenty fold improvement has been achieved. The fabrication method using photolithography has remained essentially the same but having initially utilised lasers operating in the visible light frequency, already ultraviolet light sources are having to be used and the use of x-rays is at the experimental

stage. Predictions suggest that in the next ten years these processors will work five times faster than the best available today. But beyond that the ability to fabricate smaller processors at the atomic level, for example, is far from certain.

3.2.1.2 Hardware - Storage

Important as rapid processors are, global digital libraries will require huge quantities of storage. To store the annual intake of journals received by the British Library, even in monochrome, would require terabytes of traditional disc storage.

In a videoconference a year ago I made the observation (without any research to support the statement!) that if all the disc capacity in the world was added together it would not be sufficient to hold the British Library collection at Boston Spa.

A few years ago the capacity of a CD-ROM disc on an average PC was significantly greater than the magnetic disc. Today the opposite is frequently the case.

Both will increase in capacity in the coming years by virtue of refining the present technology. However a revolution in storage technology will be needed to satisfy the demands of the global digital libraries.

Research has been carried out for many years into a variety of optical technologies, Holography and Persistent Spectral Hole Burning to name but two. In the next ten years these technologies have the potential to satisfy our storage requirements which are, of course, to store huge quantities of images.

3.2.1.3 Hardware - Communications

Communication links have become significantly faster from the '300 baud' days of the acoustic coupler and increasingly 'wireless'. Local network communications have improved significantly in the last twenty five years. We take for granted the ability to print a letter or send an e-mail to the office next door. However, remote communications remain relatively less reliable and expensive.

Client/server applications which work perfectly when run locally become remarkably unstable when run remotely! The world-wide library of the

future will need high speed, high bandwidth, reliable cheap communication but at the present I suggest this is the weak link in the interconnected world-wide library chain of the future.

The introduction of Asynchronous Transfer Mode (ATM) services capable of handling data and video, as well as voice traffic may solve some of the present problems.

3.2.2 Software

3.2.2.1 Software - Search Engine

However, developments in hardware must be matched by developments in software if the full potential is to be realised. Many of the present generation of textual search engines have their origins in the 1960s and '70s. They were designed and developed to offer indexed access to online databases. Some included automatic indexing features and natural language handling facilities but the advent of the optical disc required specialised search engines to be developed to derive the best performance from the characteristics of the CD-ROM drive. The next generation of search engine must work from optical devices just as efficiently and effectively as from conventional magnetic discs. They will also have to cope with multimedia, video, audio and pictures, all of course in colour, as well as character sets from every language of the world.

The development of the 64 bit processor and search engines using this architecture hold out the prospect of very large databases being held in memory. Today's memory costs make the exploitation of this technology prohibitively expensive but if the next generation of storage described previously comes to the marketplace this approach may well become cost effective.

The so called 'hybrid' search engines are starting to appear that will enable users to search 'locally' on CD-ROMs and then seamlessly switch to online databases for current or perhaps archival information.

3.2.2.2 Software - Operating systems

Operating systems have also had a major impact on the perception of information technology to the end users. Historically, operating systems were designed specifically for the computer hardware on which they ran. However, the advent of Unix, MS-DOS and more recently Windows have

changed that supply line. Increasingly it is the computer manufacturer that has to conform to the requirement of the operating system supplier. Microsoft has dominated the personal computer operating system market in recent years and therefore established a perception of what a user interface should look like. However, the future is less clear. Many organisations are still using their old version of Windows rather than move to Windows 95 or Windows NT. Internet browsers have appeared which have offered different means of accessing information, and Microsoft has had to respond.

4. The Impact of this Technology on the Creation of a World-Wide Digital Library

The prospects are encouraging that in the next ten years hardware and software technology will advance in those areas critical to the success of global digital libraries. With this new technology in place, what impact will this have on the existing hard copy collection, and what on the ever growing electronic collection?

4.1 Impact on the historic collections

It should become feasible and progressively cheaper to digitise existing collections.

Technology will help the preservation process by enabling scholars to access images of original material. Scanning technology may reveal currently unseen features.

However, with the exception of works of particular historic significance the world-wide digital libraries will only succeed if they contain significant amounts of material that can be identified, accessed and collated rapidly and effectively. It is crucial that the user is able to identify material of real interest with the minimum of effort, preferably via a common interface. There will be a need for many different interfaces - not least to satisfy the languages and cultures of the different countries of the world but each will, potentially, require access to any one electronically held collection.

An obvious appeal of using the World Wide Web is that it offers the opportunity to provide a universal Web browser for accessing information produced within as well as without an organisation and hence the appeal of HTML formatted documents. One problem for the information provider

is that, at present, they cannot control the look of the document at the client end - that is determined by the Web browser on the end-users PC. There is a major risk of swamping the user with too much irrelevant information in a form that is time consuming to comprehend. The Internet, in its current form is, I suggest, a prime example of a huge collection of disparate information sources that is generally difficult and unfriendly to navigate.

4.2 Impact on future collections

Obviously it is to be hoped that, increasingly, collections will include access to the electronic versions of paper material, thereby saving the expense and time of scanning. It would, surely, be tragic if we allowed the electronically held versions of material currently published in another medium to be discarded in the same way that we discarded the tapes in our typing centre.

Use of the latest technology is, however, creating new problems. It seems that every magazine on the news-stand comes with a CD-ROM or magnetic tape attached. Multi-media publications and electronic journals are already here; how long will it be before publishers will only issue their core journals in electronic form, with paper versions available as an expensive optional extra? Indeed, how long will it be before such journals use so much technology in their composition that a paper option will not be possible. The growing collection of electronic forums will present major challenges if they are to be preserved in perpetuity.

As discussed earlier storage will be a key technology in the world-wide library of the future but magnetic discs and tapes deteriorate relatively quickly and the longevity of current optical storage is in doubt. The prospects are, therefore, not encouraging that the next generation of storage technology will be totally reliable.

4.3 What can be achieved in the next ten years?

I believe that in the next ten years we will see processor and storage technology develop to the point where it will become cost effective to create significantly large digital libraries. However, that is not to suggest that all, or even a significant part, of the major collections of the world will be made available in that timescale, but rather that institutions will 'cherry pick' those parts of their collections which they believe will generate the greatest financial reward and that publishers will make a substantial part of their works available in electronic form.

The arrival of this technology will raise a number of profound issues.

Will those of us in the library information business end up as the poor relations, if technology is driven by the major players in the home entertainment business?

What of the material currently being generated only in electronic form, electronic forums for example? Will anyone preserve these for posterity? - Learned societies perhaps?

Who, if anyone, will pay for national collections to be digitised and how will it be funded? Perhaps a global pact will be agreed where each country will digitise its nations collection.

Perhaps corporations and universities will maintain digital libraries of their information or licence others to maintain their electronic collections.

Whichever is the case the implication is that with rapid, easy and cheap access to one source there will be no need to duplicate the information held in these digital libraries, we may all be buying at the 'one stop shop'.

Economic pressures on libraries may also lead them to rely on others and dispose of their current paper collections, but who, I wonder, will decide to destroy the last known non-electronic version of a publication?

The printing press enabled information to be disseminated, and safe-guarded against the destruction of the only copy, but what of the global digital library? The risk is, of course, that if more and more information is held in fewer and fewer places then these sources become increasingly vulnerable to accidental or deliberate destruction. Perhaps the visible tablets of clay will, after all, prove to be far more enduring than the invisible bits and bytes.

Swets as an Electronic Agent for Libraries and Publishers:
SwetsNet® - The Electronic Warehouse *

Pieter Rustenburg
Swets & Zeitlinger, Amsterdam, The Netherlands

Before being appointed as Director Systems and Technology at Swets & Zeitlinger Pieter Rustenburg held positions as Director of Information Technology at large international companies such as AKZO (chemical and pharmaceutical), BP (nutrition) and Aegon (insurances). He has over 25 years of experience in IT covering nearly all aspects on a national and international scale, including presentations and advisory committees. Pieter Rustenburg has a mathematical background which long ago was used for numerical calculations.

Abstract

SwetsNet® is the extension of our subscription services for information on electronic media e.g. electronic journals via Internet. It offers the following advantages:

- a single source for many titles
- a central point for information
- single index of titles offered
- varying levels of access offered e.g. table of contents *(SwetScan®)*, abstracts and full text
- crossover searching between titles
- simplified password administration
- data stored at Swets for Internet access with option for libraries to store locally
- technical assistance and helpdesk
- WWW environment
- adherence to publishers' policies on pricing and authorised access.

* Paper not received in time due to extraordinary circumstances

For libraries it provides the ease of a one stop shopping service and of a single source redelivery of all electronic media (and of course the paper subscriptions), for publishers it offers secure storage and a world-wide distribution channel for their electronic products. *SwetsNet®* allows a graceful transition from the paper era into the electronic era providing full financial and managerial control.

199

Evaluation in the Context of the Digital Library *

Frederick Wilfrid Lancaster
Graduate School of Library and Information Science, University of Illinois at Urbana-Champaign, Champaign, Illinois, USA
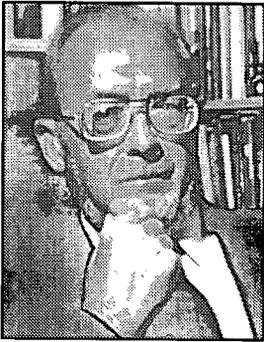
Frederick Wilfrid Lancaster is Professor Emeritus in the Graduate School of Library and Information Science at the University of Illinois where he has taught courses relating to information transfer, bibliometrics, bibliographic organization and the evaluation of library and information services and continues to serve as editor of Library Trends. He was appointed University Scholar for the period 1989-92. He is the author of ten books and has three times received Fulbright fellowships for research and teaching abroad. From the American Society for Information Science he has received both the Award of Merit and the Outstanding Information Science Teacher award. He has been involved in a wide range of consulting activities, including service for Unesco and other agencies of the United Nations.

Abstract

The digital library is sufficiently different from the more traditional print-on-paper library that it presents a new set of parameters relating to the evaluation of its use. This paper discusses evaluation criteria, problems and methods relevant to the digital library environment.

The term "digital library" can have several possible meanings. At one extreme, it can be merely a personal library of information resources maintained by an individual in electronic form. At the other extreme, it can be considered the totality of resources in digital form that can be accessed through networking capabilities. For the purpose of the present paper, however, a digital library is more like a traditional library, at least conceptually; it is a library maintained by a university or other entity to serve a particular community of users.

The objectives of such a digital library are no different from those of a conventional library: to make available to users the information resources they need at the time that they need them and to help users exploit these resources effectively and efficiently. In the digital library, however, most, if not all, resources will be in electronic form, and the great majority will be in a form that is "accessible" rather than "distributed."

Some see the library of the future as not having any "collection" of its own. It would be a mere switching center, referring users to potentially appropriate points in the vast network of resources accessible through the Internet or its successors. Others see the library as primarily a switching center but having important value-adding functions: creating guides, indexes, annotations and other tools tailored to the needs and interests of the library's own community of users and designed to improve the intellectual accessibility of those network resources likely to have greatest relevance and value to this community.

More farsighted observers (notably Atkinson[1, 2]) recognize that the library cannot survive as a mere switching center, even a value-added switching center. To justify its existence in the electronic world, the library must continue to perform one of the most important functions it now performs in the print-on-paper world: to organize the universe of resources in such a way that those most likely to be of value to the user community are made most accessible to this community, physically and intellectually. This implies that the library must act as an information filter, selecting the most relevant resources from the universe of network resources and downloading these to local storage/access facilities. Moreover, the downloaded resources will need to be organized intellectually and themselves made available to users at different levels or tiers of accessibility. In a recent paper, Atkinson[3] makes an important distinction between a "control zone" of network resources extracted and controlled by the library community and an "open zone" of everything else.

One library that has already gone a long way toward the adoption of collection development policies for electronic resources is the Mann Library at Cornell University, as discussed by Demas et al.[4] They identify various levels or "tiers" of access, illustrated in **Figure 1.** Note that some high-demand items may be downloaded from the national network to the campus network while others are merely accessible from the national network on demand (possibly through the aid of "pointers" provided locally).

TIER 1
Delivered over the campus network via the Mann Library Gateway. Anticipated high demand and need for quick response and manipulation time dictate the use of media and software which will provide very fast response time.

TIER 2
Delivered over the campus network via the Mann Library Gateway. Must be interactively available, but a relatively low number of simultaneous uses is expected and slower retrieval time acceptable. Therefore a slower storage medium, such as optical platter, may be acceptable.

TIER 3
Resources that can be delivered online via the Gateway on demand, but are not continuously available online. Tier 3 resources may be mounted on request for Gateway access or may be used in the library at any time.

TIER 4
Resources that are available in the library only (i.e., not delivered over the campus network), but that are available from many public access workstations within the library over a local area network.

TIER 5
Resources that are available in the library only, at single user stations.

Figure 1: Levels of access to electronic resources identified at the Mann Library, Cornell University. From Demas et al.[4] by permission of the American Library Association.

Based largely on this model provided by the Mann Library, one can now visualize the academic digital library as one providing various levels of access to electronic resources, as illustrated in **Figure 2**. Electronic resources in great demand (level A) are made permanently accessible
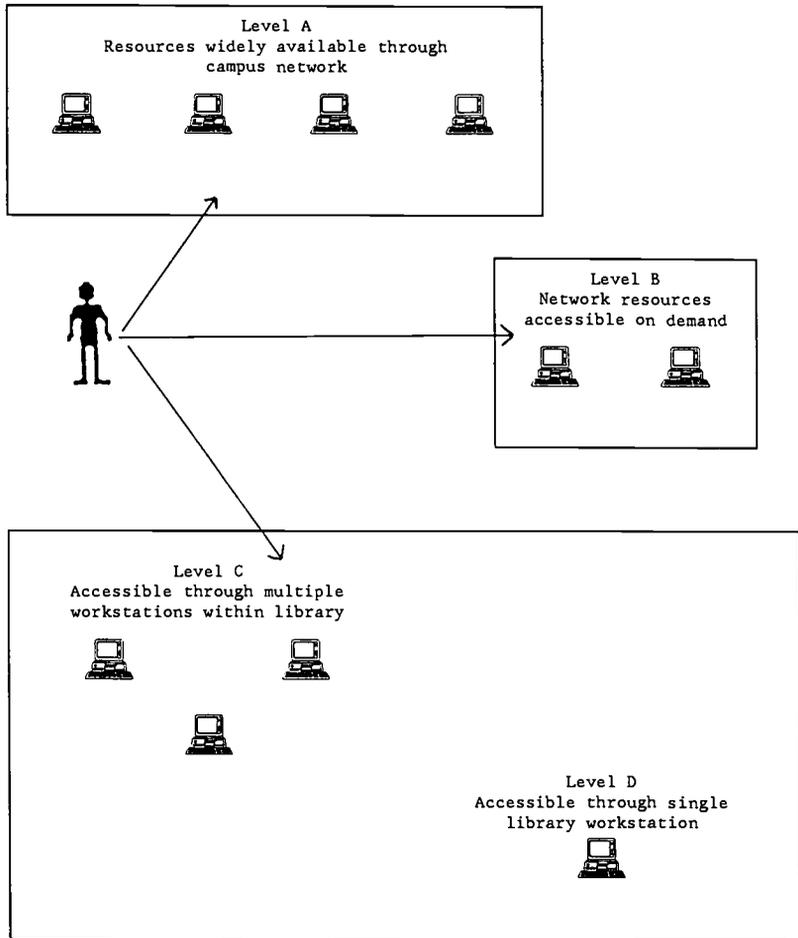
Figure 2: Possible levels of access to electronic resources provided by the library in an academic setting

203

through a campus network, while others (level B) can be accessed remotely via the campus network when needed (e.g., through the Internet). These are strongly linked to the library because the library may have been responsible for selecting the level A resources from the international network and downloading them to the campus network. It may also have been responsible for building the indexes or providing the pointers that draw attention to the level B resources. Alternatively, the level B resources may be brought personally to the attention of individual users by reference librarians consulted face-to-face, by telephone or through electronic mail. The level C and D resources are not available through the campus network but must be used within the library through a local area network or a single dedicated workstation.

Some fourteen years ago, in writing about the future of indexing and abstracting services, I visualized an online filtering system that would eventually bring relevant journal articles and other sources to individual users (Lancaster and Neway[5]). The conceptualization is shown in **Figure 3**. It assumed that, given that journals exist in electronic form and include abstracts, acceptable "accessing databases" could be built directly from the primary literature. A series of filters (really subject profiles) would be necessary to form major discipline-oriented and mission-oriented databases from all items newly added to all databases (i.e., not restricted to a particular set of journals). More refined filters would form more specialized databases from the first level databases. User interest profiles could then be applied to the second-level databases. An individual user, then, could log on to some system and be informed that X items, matching his profile of interest, had been published since last he used the system. The user may then view abstracts and, if required, get online access to the complete item. Rather than "subscribing" to any one electronic journal, the filters would keep him informed of everything matching his interest wherever published. At various levels, databases of abstracts would be available for searching when specific information needs arise.

The model of **Figure 3** is highly appropriate to the present information environment made possible by the Internet although, as suggested earlier, it is probably the library community that should be most heavily involved in building the necessary filters, especially those that are closest to the individual user. Moreover, libraries will be concerned with filtering all types of resources and not just those that are the equivalents of the present journal articles.

Databases of primary text
(roughly equivalent to present periodicals)

Databases of abstracts derived from
primary text (discipline and mission-oriented)

More specialized databases of abstracts

Individual user
SDI and retrospective search
covering everything published
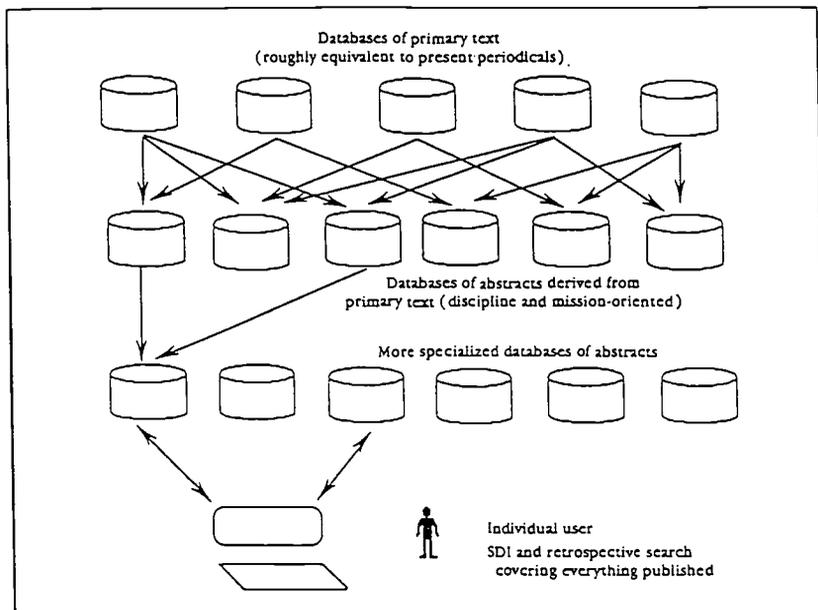
Figure 3: Filtering levels in a digital library environment

Evaluation Concerns

Traditional models for evaluating library services are largely based on whether or not the library, its resources and its tools can assist users to find the items or information they need. Technology has enabled libraries to expand access to information resources beyond the physical walls, both for library staff and for users. In some cases this has meant that the library no longer plays the role of intermediary in the delivery of information. As the locus of information resources traditionally associated with a trip to the library becomes increasingly decentralized and remotely accessible, the role of the library in providing these services will inevitably change. So too will the library's ability to directly evaluate its performance. How will the traditional model change as we move increasingly into a digital and networked environment, where users have direct access to remote information, and rely less often on the library and its resources for answers to their questions? What will become the role of the library as we now know it, with its quantifiable resources and collections? How can the library use

technology to better understand the needs of library users, both in the traditional and the evolving digital library setting?
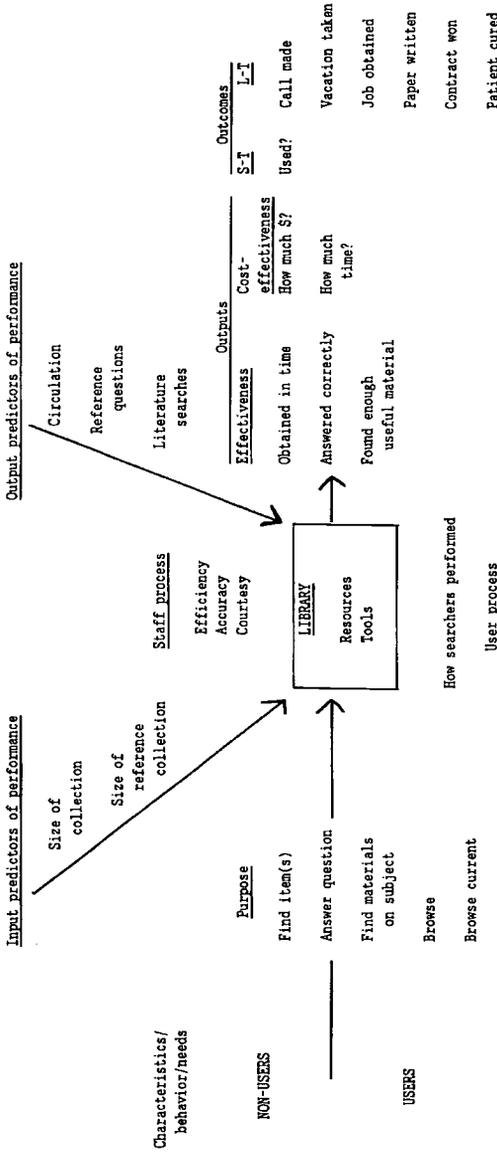
Figure 4: Major components of evaluation model for traditional libraries

Figure 4 presents a model that depicts the most important current components of traditional library evaluation, and how they are employed. This traditional evaluation model has identifiable components, such as user characteristics, reasons for using the library, the size of the library collection, staff efficiency and accuracy, and whether user needs are satisfied within the necessary time frame. Characteristics, behavior, and needs of users can now be observed, to some extent at least, because most of the services offered by traditional libraries require that the user enter the library at some point to receive them. Little is known of the characteristics, behavior, and needs of non-users in most communities.

The input predictors of the library's performance include the size of the general and reference collections and the rate at which new materials are added. Within the library, the interactions among staff processes, the library's resources and tools, and the user processes combine to produce outputs and, ultimately, outcomes. Measures of output and outcome indicate whether the information or item was obtained, whether used, and whether it had short-term (ST) or long-term (LT) impacts on the user. The most obvious output predictors of performance include circulation, number of reference questions answered, and the number of literature searches performed. Libraries normally collect these data on a regular basis, either manually or through electronic monitoring. Such data quantify the services provided. True output measures relate to the effectiveness of the work done, in terms of correctness, timeliness, desired amount, and so on. While commonly accepted output measures exist (e.g., shelf availability), they require some effort to apply. Outcomes are rarely looked at: very little is known about what use is made of publications or information after users leave the library.

Some changes are needed in order to build an acceptable model for evaluation in a digital library environment. First, it is clear that user groups will change, as will the library's ability to monitor their needs and behaviors. Since users will no longer need to come to the library to obtain access to library materials, they will be more remote, and more anonymous. It is likely that the group of users may widen to include previous non-users. This could occur because the library may provide convenient or cost-effective electronic access to information that formerly was not available in the library, or because the resources are now perceived to be more accessible than they were before.

Secondly, the purposes for which users seek information may change in the digital library environment. Users will have access to the electronic tools

needed to build and organize their own databases of information, to create new documents incorporating or referring to that information, and to find people to communicate with or to collaborate with on future projects.

Thirdly, the role of the library in information provision will change, although it is too soon to determine in what ways, and to what degree these changes will occur. In a networked environment, as suggested earlier, a library may become primarily a database builder, selecting electronic information of greatest interest to users and building databases incorporating that information.

Lastly, and perhaps most obviously, the nature of the library's "collection" will change. Resources are becoming more dispersed and intangible as the concept of a collection beyond the library's physical walls is extended. The nature of the library's "control" over the contents of these collections is also changing. Items in collections, once considered discrete packages of information, are developing fuzzy boundaries, due to the ability of authors and users to provide hypermedia links among textual and other items in a networked digital environment. Documents can now be dynamic and interactive in nature, and may not be printable. The content of collections, or items within collections, may also change rapidly.

It is clear that such yardsticks as size of collection or number of items acquired annually have little meaning for the digital library. Also of little meaning are all output measures that relate to ownership of physical items, "shelf availability" being perhaps the most obvious example.

Presumably, "items accessed" replaces "circulation" as a quantitative measure of use. However, if the actions of users can be monitored through some form of transaction logging, finer measures of use become possible: how much text is accessed, how much is merely viewed, how much is downloaded to personal databases, and so on.

The fact that many users will be "remote" and "anonymous" makes evaluation more difficult. The fact that some of their actions are susceptible to monitoring makes some types of evaluation easier to implement.

If the digital library is used for the same purposes as the traditional library - to find a particular item, to find the answer to a question, to find information on a particular subject - the evaluation criteria also remain more or less the same. Nevertheless, the digital library may present special problems in evaluation, as suggested earlier; e.g., "items" may have rather fuzzy boundaries and some text may lack stability (databases, and perhaps even individual items, may be updated frequently).

208

If the digital library is used for other purposes - e.g., to build composite documents from several sources scattered throughout the network, to locate people with similar interests, and so on - different evaluation criteria will be needed.

In a highly developed digital information network, one can visualize a situation in which a scholar builds a personal database by downloading from network resources the text and graphics of most direct interest. This scholar may be supported by some form of institutional library (maintained perhaps by a university, college, or company) which has also downloaded from the broader network the text and graphics most likely to be of value to the institutional community. The situation is depicted in simple form in **Figure 5.** If an important role of the institutional library is to "feed" the personal databases of its users in a dynamic way (e.g., through some form of profile matching), the most obvious evaluation criterion would relate to the frequency with which an individual needs to go beyond personal and institutional resources to satisfy a particular need. Presumably, if the institutional library was doing an excellent job, most of the individual's needs would be satisfied from his/her own database, some from the institutional database, and very little from the wider network resources.

The digital library environment may be one in which there is a high level of interaction between users and documents and perhaps between users
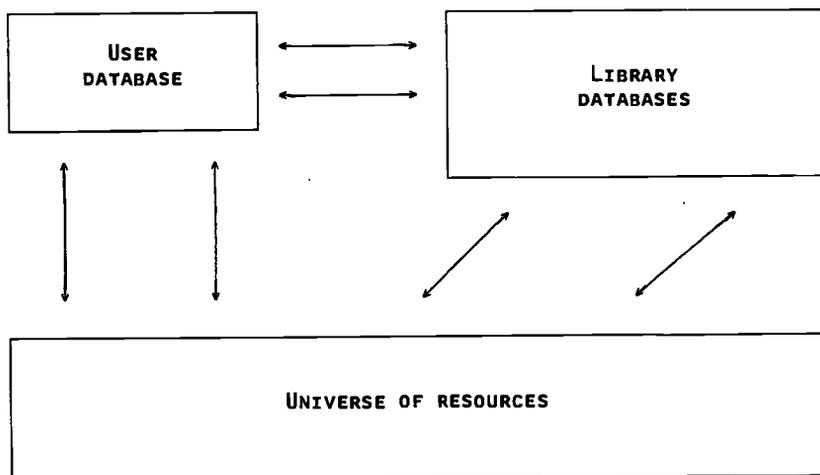
Figure 5:   Interacting components in a digital library network

and users. The traditional roles of the library in information organization and delivery are being challenged, and institutional boundaries are becoming fuzzy. Many communities are developing their own databases of organized information resources in ways that enable them to access and manipulate this information by methods most meaningful to them. Emphasis in data sharing is placed on the most convenient format for the user's needs, as opposed to the standard data formats that libraries employ in order to facilitate data exchange. The term "library" is being extended in the metaphoric sense, to the point where it will not simply refer to the traditional physical structures and collections organized and managed by library professionals. In the most basic sense, users are the builders of their own digital information environment.

Whereas the traditional library enables users to interact simultaneously with the same materials at one physical point in time, the digital library increases the opportunities for users to make serial as well as synchronous use of the same materials in digital format, as well as enabling them to communicate with each other about the material at hand.

A debate held at the 1995 annual meeting of the Medical Library Association raised several important questions for library administrators, including one that suggests that more stringent evaluation criteria may be appropriate to the digital library environment:

> To better serve clients, do we need to change their expectations of instant gratification - i.e., information on demand - to a response time that permits more thoughtful and thorough results as is typical of other professions. (Nagle[6], p. 662)

The development of digital libraries is accompanied by a multi-disciplinary interest in evaluation. Evaluation in the six NSF/ARPA/NASA-sponsored Digital Library Initiative projects incorporates qualitative methods developed by researchers from various fields - sociology, psychology, communications, computer science, and engineering (URL - http://www.grainger. uiuc.edu/dli/national). Researchers in these projects are working to find out what are the most significant factors affecting use of electronic information in various areas of activity. Online system transaction monitoring is being employed widely to study the searching patterns of users, along with interviews, questionnaires, video taping, and other methods. Ironically, we may soon know more about user behavior and preferences in the digital library than we do about user behavior and preferences in the traditional library.

210

References

1. ATKINSON, Ross. Networks, hypertext, and academic information services: some longer-range implications. *College & Research Libraries*, 54, pp. 199-215, 1993.

2. ATKINSON, Ross. Text mutability and collection administration. *Library Acquisitions: Practice and Theory*, 14, pp. 355-358, 1990.

3. ATKINSON, Ross. Library functions, scholarly communication, and the foundation of the digital library: laying claim to the control zone. *Library Quarterly*, 66, pp. 239-265, 1996.

4. DEMAS, S. et al. The Internet and collection development: mainstreaming selection of Internet resources. *Library Resources & Technical Services*, 39, pp. 275-290, 1995.

5. LANCASTER, F. W. and NEWAY, Julie M. The future of indexing and abstracting services. *Journal of the American Society for Information Science*, 33, pp. 183-189, 1982.

6. NAGLE, E. The new knowledge environment: quality initiatives in health sciences libraries. *Library Trends*, 44, pp. 657-674, 1996.

211

Multilingual Access to Libraries' Databases

Genevieve Clavel-Merrin
Clavel SA, Pully, Switzerland

Genevieve Clavel-Merrin is a consultant for the firm Clavel SA, and has been contracted to the Swiss National Library (SNL) since 1994 to manage various projects including the development of a concept for multilingual subject and author access, and the development of a CD-ROM containing data from different library networks in Switzerland as well as the database of the SNL. Prior to that she worked from 1987 - 1994 with REBUS (Network of SIBIL users), Lausanne and earlier for the Bibliothèque cantonale et universitaire, Lausanne. She is a graduate of the University College of Wales Aberystwyth (1980, French and Library Science, 1986, Masters in Library Science) and an Associate of the Library Association of Great Britain.

Abstract

Multilingual access to library databases is a topic of concern not only to users in countries such as Switzerland in which several languages are spoken, but also to those who search for information in databases containing material in more than one language. The growth of networks means that we can easily access databases outside our own immediate circle - in another town, another country, another continent. Until there is wide-spread compliance with Z39.50, users will often be faced by interfaces in a variety of languages. More critical, however, are the problems encountered when attempting subject or author access in other languages. The paper will consider two approaches to multilingual access: the use of multilingual thesauri or authority records which implies translation work before the user searches in the database, and the

translation of the search statement at the time of searching, which implies the existence of parsers and multilingual dictionaries.

1. Introduction: The Swiss Context

Switzerland is well placed to understand the problem of multilingual access to bibliographic data since in a country of 7 million inhabitants there are 4 national languages:

- German   75%
- French   20%
- Italian   4%
- Romansch   1%

plus of course a widespread use of the English language.

The three main languages are taught in the different federal states e.g. German as the first additional language in the French and Italian speaking states (plus English), French in the German speaking states and both French and German in the Italian speaking states. By the end of high school, Swiss students, and particularly those who intend to carry on their education at university or technical high school, are expected to have a working knowledge of at least one of the other official languages, and also of English.

Researchers frequently need to find and use materials in other languages, and need also to extend their search for material outside their own library and linguistic context. Within a library or library network, the range of material in languages other than the 'main' language may be very high: in the Swiss-French network for example French-language material accounts for only just over one third of the documents catalogued.

The printed production of the country largely reflects the linguistic balance: German language material predominates (60%), followed by French (21%) and surprisingly, English (10%). Italian accounts for only 2%.

A university student must have as a minimum, a passive reading knowledge of another language in order to make use of material found in searches either in Swiss libraries or in libraries abroad.

It might seem ironic therefore in the above context, that with the exception of one network: the ETHICS network (essentially in the field of science and technology), there is no true multilingual access to bibliographic data in Swiss libraries. The Swiss National Library is currently exploring different approaches to solve the problem.

2. What does Multilingual Access Cover?

In the context of this presentation, multilingual searching is limited to the provision of multilingual access points to bibliographic databases. Interfaces (display screens, user dialogue, help screens) are not included. The context is that of the bibliographic record and not that of the full-text database nor of the World Wide Web, which present their own challenges to cross-linguistic searchers as the information retrieval sector now terms them.

Multiple script environments provide other barriers to access and are often considered in tandem with multiple language environments, but they will not be included here. Note though that considerable work is being carried out in this field e.g. the NEC Corporation is investigating a language conversion front-end to the World Wide Web which will translate a user's request from Japanese to English and then translate the resulting documents found from English to Japanese.[1]

3. Do our Users want Multilingual Access?

Before attempting to provide multilingual access, we should consider the users' needs: do they really need this type of access, especially in a Swiss context in which, as mentioned above, students need a working knowledge of other languages in order to be able to study, and so should theoretically be able to carry out these searches unaided?

It is worth noting here that a reading knowledge of a language does not imply that the user can actively search using terms from that language: we may speak of an active or passive knowledge. A study carried out at the University of Fribourg, Switzerland for the CANAL/LS project inquired into the linguistic proficiency and user needs of students (over 500 users replied to the questionnaire). 65% of respondents already carried out searches using words from other languages than their own while 88% considered that material in other languages would be useful to them. So although

many users in this university (situated in a bilingual area) can manage to find their own material, for nearly one quarter of respondents help would be appreciated.

4. Multilingual Access to Controlled Vocabulary

Under controlled vocabulary we will consider especially subject access, although the approach described here may also be applied to corporate names and some author names. A variety of different interpretations are possible in terms of what is indexed, in which language, and how the searcher may use the resulting terms or headings. The following description presents the viewpoint for subject access in the Swiss National Library's context: different countries, with different contexts and needs may find this view too 'strict' in some ways.
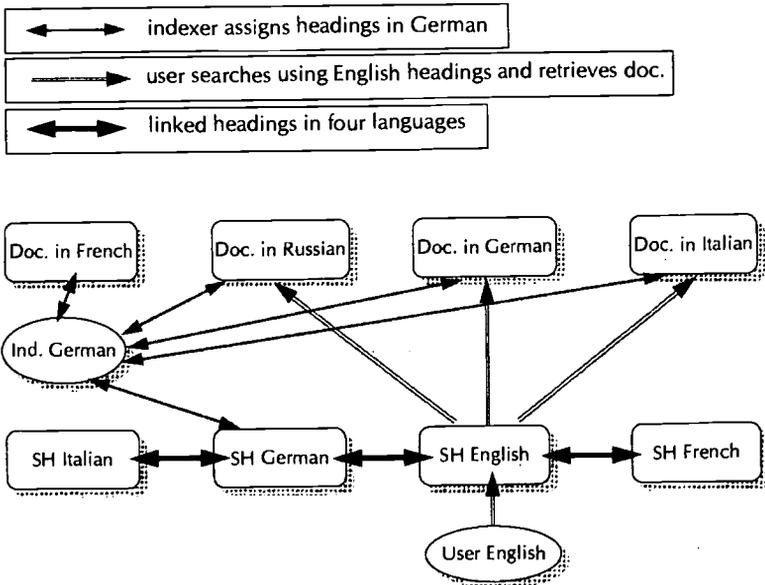
Figure 1: Subject indexing and searching in a multilingual environment

Ideally, the indexer should be able to analyse a document and assign subject headings in his/her native language, while the user should be able

215

to enter subject search terms in his/her native language. The language of the document should have no influence on the indexing language nor on the language used for searching. Practically speaking of course, there will be restrictions: there is a limit to the number of languages in which a subject headings list will be maintained and thus in which the user may search. For our purposes here, we can imagine that it exists in four languages (German, French, Italian, English).

A German-speaking indexer will use the German-language subject headings to index documents in all languages i.e. whether the document in question is in English, French, German, Italian or Greek, the subject headings assigned by this indexer will be in German.

When searching, the user opts to search in one of the available languages e.g. English, and will retrieve all documents indexed using the concept concerned, thanks to the links between the different language expressions of the concept. When the user displays the bibliographic records, tracings for the subject headings are in the language used for the search.

To provide such an access requires the creation and maintenance of a thesaurus or list of subject headings with links between the different language forms of a concept. The structure of such a thesaurus may include the use of a classification such as the UDC which links the terms. This is the technique applied in the ETHICS system in Switzerland:

DK-ZAHL = 519.68
1 WISSENSCHAFTEN/COMPUTERWISSENSCHAFTEN
2 DATENVERARBEITUNG/ELEKTRONISCHE DATENVERARBEITUNG
3 INFORMATIK + COMPUTERWISSENSCHAFTEN
4 INFORMATIK
5 COMPUTERWISSENSCHAFTEN
6 ELEKTRONISCHE DATENVERARBEITUNG
7 EDV (ELEKTRONISCHE DATENVERARBEITUNG)
8 SCIENCE/COMPUTER SCIENCE
9 ELECTRONIC DATA PROCESSING
10 DATA PROCESSING/ELECTRONIC DATA PROCESSING
11 COMPUTER SCIENCE
12 INFORMATIQUE

Figure 2: Multilingual subject record in ETHICS

Other options include coding the data directly in the bibliographic record (the technique adopted by the National Library of Canada) or in the authority records. In the Swiss National Library it is planned to store multilingual headings in multiple 1xx fields in the authority record rather than in the bibliographic record in order to enable easier management, global changes and multilingual keyword indexing.

150	Bibliothèque, magasins	(fre)
150	Bibliotheksmagazine	(ger)
150	Library stacks	(eng)
450	Magasins, bibliothèque	(fre)
450	Bibliothèque, rayonnage	(fre)
450	Rayonnage de bibliothèque	(fre)
450	Magazine, Bibliothek	(ger)
450	Library shelving	(eng)
550	Signature (bibliothéconomie)	(fre)
550	Signatur (Bibliothekswesen)	(ger)

Figure 3: Planned multilingual subject record structure for SNL (fictitious headings!)

Whichever technique is adopted, it is essential that multilingual access be offered not only in the classic subject strings but also in keyword access to those strings.

Design of such a system must also take into account: how to add new languages, how to manage partially translated lists, import and export of authority records and bibliographic records. For further details see "References"[2].

4.1 Potential Advantages

The advantages of such a concept are those of the standard controlled vocabulary subject headings list:

Synonyms are controlled and a search structure may be incorporated into the list (see also, broader and narrower terms).

217

In addition:

The multilingual structure may be transparent to the user e.g. if the different languages are not interfiled, though opinions vary on the usefulness of such an approach.

REGISTRE-MATIERES ALPHABETIQUE :   LANGUE REG-MAT.: A
1 ADAPTATION/BEWEGUNGSADAPTATION (ANATOMIE U.PHYSIOLOGIE)
2 ADAPTATION/BOTANY
3 ADAPTATION/BRIGHT TO DARK ADAPTATION (VISION)
4 ADAPTATION/CELLULAIRE A L ENVIRONNEMENT (CYTOLOGIE)
5 ADAPTATION/CELLULAR ADAPTATION
6 ADAPTATION/CLIMAT (ANATOMIE ET PHYSIOL.)
7 ADAPTATION/CLIMATIQUE ET EDAPHIQUE (PHYTOGENETIQUE)
8 ADAPTATION/COLORATION (ANIMAL ETHOLOGY)
9 ADAPTATION/CULTIVATED PLANTS
10 ADAPTATION/CULTURAL
11 ADAPTATION/DARK ADAPTATION (VISION)
12 ADAPTATION/DE L AGRICULTURE
13 ADAPTATION/DUNKELADAPTATION (PHYSIOLOGISCHE OPTIK)
14 ADAPTATION/ECOLOGIE VEGETALE
15 ADAPTATION/EVOLUTIONARY FACTORS (BIOLOGICAL EVOLUTION)

Figure 4: Interfiled subject headings in three languages

REGISTRE-MATIERES ALPHABETIQUE :   LANGUE REG-MAT.: F
1 ADAPTATION (BIOLOGIE)
2 ADAPTATION (EVOLUTION BIOL.)
3 ADAPTATION/ANIMAUX TERRESTRES
4 ADAPTATION/AU TYPE D EXPLOITATION (ECONOMIE D ENTREPRISE)
5 ADAPTATION/CELLULAIRE A L ENVIRONNEMENT (CYTOLOGIE)
6 ADAPTATION/CLIMAT (ANATOMIE ET PHYSIOL.)
7 ADAPTATION/CLIMATIQUE ET EDAPHIQUE (PHYTOGENETIQUE)
8 ADAPTATION/DE L AGRICULTURE
9 ADAPTATION/ECOLOGIE VEGETALE
10 ADAPTATION/PHYSIOLOGIE GENERALE
11 ADAPTATION/PHYSIOLOGIE VEGETALE
12 ADAPTATION PHYSIOLOGIQUE (ECOLOGIE ANIMALE)
13 ADAPTATION/QUADRIPOLES D (TECHN.OSCILLAT.ELECTR.)
14 ADAPTATION/ZOOLOGIE
15 ADAPTATIONS/CINEMATOGRAPHIQUES D OEUVRES LITTERAIRES

Figure 5: The same sequence in French only

Search possibilities are extended since all translations of a concept can be keyword indexed.

Terms are translated in context and may be qualified to reduce ambiguity.

4.2 Potential Disadvantages

- The main problem is that encountered in the management of any subject heading list: cost. The creation and maintenance of such a list for a general collection, or at a national level, would require substantial investment and staff. In Switzerland for example, staff shortages in ETHICS mean that French translations of German terms are delayed and that a unified approach to translation in different subject areas has not been possible.

- Access is limited to documents which are subject indexed. In many catalogues, retroconverted data is not subject indexed, nor are certain categories of documents e.g. fiction, in a university library. These therefore cannot be retrieved through such a search.

- Depending on the structure (e.g. multiple 1xx fields), extensive and expensive changes to systems and formats (if UNIMARC is not used) and standards may be required.

- One might also query the utility of translating and maintaining a whole list if only some terms are used in searches. The translation in advance of subject headings reflects a 'just-in-case' philosophy to multilingual access, and it is not certain that we can afford it. It is therefore useful to consider other options, such as the translation of keywords at the point of search.

5. Multilingual Access to Free-Text / Keywords

This approach is based on the idea that translation of keywords is carried out as required by the user. In the Information Retrieval environment a wide variety of controlled studies are being undertaken, but the approach has been more or less ignored by libraries until now. However, within the framework of the LIBRARIES program of the Commission of the European Union, a project - CANAL/LS - began on January 1st, 1995 and will run until December 31st, 1996. (URL: http://www.sz-sb.de/canal/can1.htm)

CANAL / LS = Catalogue with Multilingual Natural Language Access / Linguistic Server

Partners:

CRIL INGENIERIE (France) (project leader)
TEXTEC Software (Germany)
Saarbrücker Zeitung (Germany)
VERBA LOGICA (Spain)
Bibliotheksverbund der Universität des Saarlandes (Germany)
Universitäts- und Landesbibliothek Düsseldorf (Germany)
SNL Bern (Switzerland) (associated partner)

The aim of the project is to allow the user to enter a keyword search which will be translated into other languages before being re-entered into a library system. The project aims to recognise normalised forms, compound and multi-word phrases for translation.
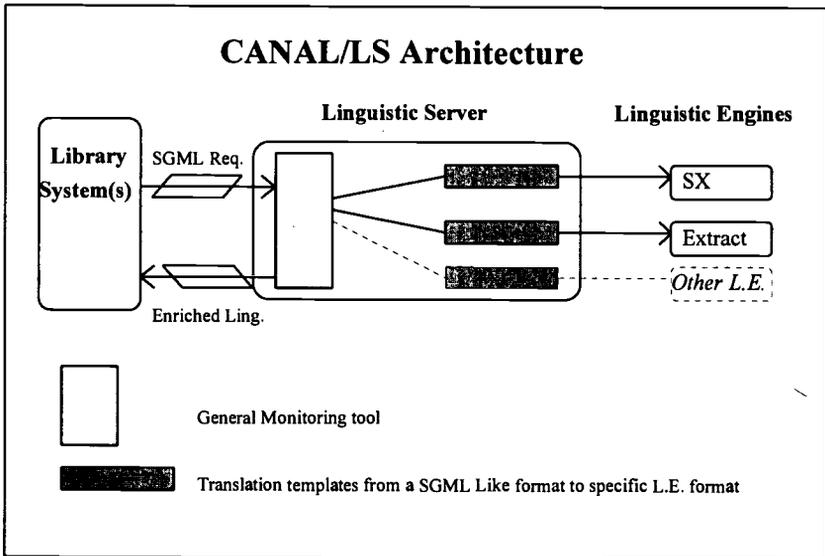
Figure 6: CANAL/LS structure

In order to achieve this, the project has developed a Linguistic Server (LS) which analyses the query entered by the user. The LS passes the request to a Linguistic Engine (LE) which performs the linguistic analysis and the

translation process itself. Once the request has been translated (into one or more other languages using one or more LEs), it is sent back to the library system which uses the result as the basis of a search in the catalogue. The LS is designed to be able to communicate with different library systems and with different LEs. The communication between the different parts of the system is considered as an exchange of messages (Linguistic Messages or LM). These are coded in SGML, and a common DTD for the messages between library system and Linguistic Server on one side and between LS and LE on the other has been defined. The system is designed to be modular: two prototypes have been prepared running on different platforms:

- library system SABINE (used in the Bibliotheksverbund der Universität des Saarlandes, Saarbrücken, Germany) and the Linguistic Engine EXTRAKT (derived from work carried out within the ESPRIT project EMIR: European Multi Lingual Information Retrieval)

- library system ALLEGRO (for the Universitäts- und Landesbibliothek Düsseldorf, Düsseldorf, Germany) and the Linguistic Engine EXTRAKT or SX (from the Fachbereich 5.5 of the Universität des Saarlandes).

The EXTRAKT system analyses the following languages: German, French, English and Spanish, using full-form dictionaries.

German: 1 million entries = 180,000 different words (800,000 with umlaut + 171,000 entries with expanded umlaut); 45,000 proper names and 3,300 abbreviations.

French: 277,000 entries = 50,000 different words

Spanish: 36,000 entries

English: performed by an analyser in combination with a dictionary of irregular forms (around 1,000).

For German, it is also possible to analyse compound names, using the dictionary plus a special grammar. Multi-word phrases may be expressions, compound words (e.g. pomme de terre), syntactical groups, split verb forms. They are analysed by a special multi-word recognizer using rules stored in a specific dictionary. Continuous and discontinuous word groups can be recognised.

Tests on the system in October 1996 aim to show if the improved search results expected can be provided by such a system. In addition we need to

221

explore the following potential advantages and disadvantages of such a system.

5.1 Potential Advantages

- In the CANAL/LS experiment, searching is restricted to title words, but in theory such an approach could be extended to all fields of the bibliographic record, including subjects if they exist.

- It is 'on demand' translation: if the user wants to retrieve documents in other languages the option may be activated.

- Existing dictionaries may be used: theoretically, the modular structure should enable their easy addition.

- Since it is a client approach, largely independent of the library system, it should require fewer changes to bibliographic records, authority formats or the systems themselves. This however needs to be explored further.

5.2 Potential Disadvantages

- The traditional keyword problems of synonyms, ambiguous titles and semantic context are not solved.

- The applicability of such a tool, to a general library context rather than to a specialised subject field is not guaranteed, nor is its appropriateness for corporate names.

- The choice, maintenance, storage and update of multiple dictionaries requires resources and expertise. (However, we need to compare this with the effort needed to maintain a multilingual thesaurus).

- It may be better suited to full text or abstract than to the bibliographic record.

Further investigation and testing is required to clarify these points.

6. Conclusion and Perspectives

It is encouraging to see the efforts being made in the CANAL/LS project. They represent a pragmatic approach to a problem which can only increase as users have greater access to networked resources. However, the alternative approach i.e. preparation of multilingual subject heading files

should not be abandoned without further study. The two approaches may prove to be complementary, but of course the question remains as to whether we have the money to provide both?

At the 1996 European Library Automation Group (ELAG) meeting, Berlin April 1996, a workshop on the topic of multilingual problems in networking made the following recommendation:

> "Ideally each library should offer:
> access (interface and bibliographic) in the country's language(s),
> plus one other widely used language
> ...This task could be assumed by the National Library in each country ... In some countries it may be more appropriate for another institution to carry out this task, perhaps in the university environment."[3]

As we move towards a world-wide library, it is time to decide whether or not we in Europe are prepared to invest in multilingual access to our library databases, whether it be in the form of previously translated headings or translation of terms at the point of searching. Whatever we decide to do, we must ensure that we cooperate, as is underlined by ELAG. I hope that ten years from now we will not still be discussing what we could or should do as we have been doing for over ten years now, but rather be carrying it out.

References

1. YAMABANA, Kiyoshi, MURAKI, Kazunori, DOI, Shinichi and KAMEI, Shin-ichiro. *A language conversion front-end for cross-linguistic information retrieval.* Paper given at the Workshop on Cross-Linguistic Information Retrieval, SIGIR'96, Zürich, August 22nd 1996.

2. LEHTINEN, Riitta and CLAVEL-MERRIN, Genevieve. *Multilingual and multi-character set data in library systems and networks: experiences and perspectives from Switzerland and Finland.* Paper presented at the IFLA Section on Cataloguing's Workshop on Multi-script, Multi-lingual and Multi-character Issues for the Online Environment, Istanbul 1995. (In publication).

3. CLAVEL-MERRIN, Genevieve. *Multilingual problems in networking [Workshop 9] : report.* ELAG Library Systems Seminar 20 : Quality of electronic services, Berlin April 24 - 26, 1996. (In publication).

223

A Model for the Electronic University Library

Mel W. Collier*
De Montfort University, Leicester, United Kingdom
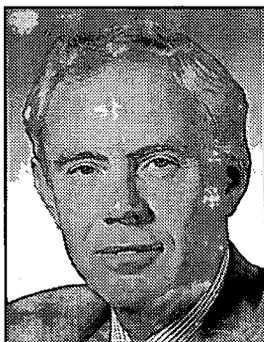
Professor Collier is responsible for libraries, computing, networking, media services, teaching and learning development and staff development at De Montfort University. For many years he has been active in research and development of library information technology from involvement in early real-time system development to research with microcomputer-based applications. He is chair of the Research Committee, Library and Information Commission, chair of the British Council Libraries and Information Advisory Committee, chair of the Management Committee of UKOLN and Chairman of the International Institute for Electronic Library Research. He is experienced in the management of large scale international projects and has done much work abroad.

Abstract

De Montfort University has been working on a wide range of electronic library projects since 1991. The lessons learned from these projects are presented along with a definition and characteristics of the evolving electronic library. In order to progress this work an Institute for Electronic Library Research has been established for which the next major challenge is to specify and implement an integrated electronic university library. This challenge is being addressed through a joint research programme with IBM, which has recently announced its "digital

---

* Mel Collier could not attend the Symposium due to extraordinary circumstances. The paper was presented by Kathryn Arnold.

library architecture" (DLA). De Montfort University will develop a pilot electronic library, based on the DLA, using an IBM SP2 supercomputer as the hardware platform. The pilot will initially address the integration of images using the ELISE framework with text in TIFF, PDF and SGML formats. The system will operate as a massive web site accessed by students through a common user interface.

Introduction

My colleagues and I have been privileged to make a number of presentations to the Essen Symposium in which we have over the last few years, described the progress of electronic library developments at De Montfort University (DMU). Today the work at DMU amounts to a substantial corpus of research results over a range of technologies and standards. When we look at it however from an operational point of view it is still a series of somewhat fragmented or at best loosely coupled projects. It is our wish to take those results which appear to be most viable in the medium and longer term and weld them into an operational integrated digital library for our university, and in doing so we hope that the emerging model will be one which other libraries and developers will find helpful.

Background

First let us summarise the work which has gone before in order to identify the components which will comprise our integrated approach.

ELINOR   Uses Excalibur EFS document image processing technology, with test scanned and stored as TIFF images. Documents are OCR'ed and searchable using fuzzy searching by the Excalibur search engine.

ELISE   An EU funded project which has developed an early prototype for interconnection of image banks at DMU, V&A and Tilburg. Images are captured using Kodak PhotoCD and JPEG compression applied. Images are stored in an Index Plus and database managing JPEG and BMP formats. Tilburg has developed a Z39.50 interface.

225

CIMI   De Montfort is working jointly with V&A and CIMI (Computer Interchange of Museum Information) in the US to develop a Z39.50 interface to the V&A image bank.

HELIX   This is an eLib project which takes the ELISE approach to provide networked image banks at DMU (National Art Slide Library), St. Andrews (Valentine Archive) and the Hulton Getty Picture Library. Images will be distributed over Super-Janet to UK Higher Education Institutions.

ELSA   An EU funded project in which Elsevier supply 5,000 SGML tagged documents to DMU. The viewer is supplied by Jouve Systèmes d'Information. The documents support HTML hypertext links.

PHOENIX   An eLib project of which DMU is a partner with South Bank University and Huddersfield University. The project will provide on-demand texts for students. Materials are licensed for academic use and held in PDF format, viewed by an Adobe Acrobat reader.

EPRG   Electronic Publishing Research Group led by Dr. P. Robinson which is publishing a corpus of SGML encoded major works. Works include The World Shakespeare Bibliography, Johnson's Dictionary and Chaucer's Wife of Bath Prologue.

In addition to these DMU projects there are some commercial initiatives which we intend to consider including:

IDEAL   A repository of Academic Press Journals mostly in PDF format and available over the Internet.

EEJOS   Elsevier electronic journals on subscription. Titles will be delivered on CD in a variety of formats as required by the customer.

Formation of the International Institute for Electronic Library Research

The spectacular rise in the volume of our research and development work led us in mid 1995 to reassess the situation. Until then the main task of driving research had been carried out by the sheer hard work and determination of staff who in most cases had a full-time operational role in

the University. It was clear that the volume and importance of the work should be properly recognised and resourced through an appropriate structure. It was also important to manage projects as an inter-related whole, rather than in isolation as was the case hitherto.

It was therefore decided to form the International Institute for Electronic Library Research which would be able to reflect appropriately the prestige of the work being done and provide a focus and springboard for further work. The Institute would be able to consolidate the positioning of De Montfort in the national and international framework and provide a critical mass of research volume and quality in the context of the UK Research Assessment process, which is highly important in gaining structural research funds from the UK Higher Education Funding Council.

The Institute was launched in March 1996 with two new research professors as co-directors and a number of full-time research staff. Other staff of the University who carry out electronic library research on a part-time basis are specifically associated with the Institute.

Lessons Learned

The last six years have been a period of intense activity and the digital library has moved from being the tentative proposition of a few enthusiasts (often received with much scepticism) to a concept which is receiving endorsement and support at national and international level. In fact the lesson first learned should perhaps be the first of the following list:

- The digital library will develop more quickly than you think. Professionals and organisations need to prepare more urgently their skills and infrastructure.
- The digital library is still a complex, unstable entity for which little theoretical structure exists. This instability will be a continuing characteristic which will need to be encompassed by professionals and organisations.
- Because of this inherent instability, investment and implementation is relatively high risk, yet must be faced. This situation is more challenging than at earlier periods in the development of library information technology because:
- We are operating in global environment. New products and services can emerge suddenly from the developed and developing world and can become de facto standards much more quickly than ever before.

227

- Co-operation is therefore an absolutely key factor for maintaining competitiveness, avoiding unproductive effort, sharing risk and developing global infrastructure. The private sector will be indispensable here for the public sector simply cannot maintain the investment that will be required to deliver the digital library on a global scale.

- Content of the digital library will become the dominant factor. Already preparations are being made to digitise content for delivery over the nascent digital library infrastructure. It is access to content which will finance continuing development.

- Copyright issues will be resolved or side-stepped because the market will demand it. Despite much continuing uncertainty, one can see in retrospect that much progress has been made towards licensing agreements in only a few years.

- The economics of the digital library are not yet well understood. The digital library should deliver the information more cheaply for that is the history of information technology, but a combination of protectionism and investment requirement is keeping costs high. For individual libraries cost modelling of the total actual cost of the digital library compared to the print based library is not a well researched topic but that situation will surely change very soon.

- Jobs and roles will change very rapidly. Those concerned with managing stock will tend to decline. The emphasis will be on high level skills to manage the digital library and high calibre training and interpersonal skills to help users access it.

The Next Step

We now come to the most difficult aspect of all: the transfer of research in the small scale experimental framework to full scale implementation. Project work takes place within circumscribed parameters and inevitably to a certain extent in isolation. This is particularly the case with EU work where projects must be designed to fit the interests of the partners and of the programme itself. For a university like De Montfort the results of that work must then be taken and integrated to form a meaningful operational model.

De Montfort University is now at this stage. We have experience in project work in document image processing, full colour image banks, the handling of SGML and other formats, CD-ROM production and networking and so

228

on, and we can draw on the experience of our partners. We are in conversation with key industrial partners regarding joint development projects. Our new extension to the Leicester City Library opening in 1997 will be a large high technology study area with 600 fully networked reader places and the other electronic libraries which will follow quickly thereafter will be important catalysts in this process. Our model for the development of an integrated electronic library is under discussion and will be implemented over the next two years. Other models such as Tilburg and in the United States are available to further guide and inform us. The results of the UK eLib programme will soon also start to flow. I am confident that although there is still considerable risk and technical and legal uncertainty we will see the digital university library emerge on a substantial scale during this coming period.

Digital Library Concept

Going back to our first electronic library project our digital library concept was originally defined in 1991 as

"a teaching, learning and study environment in which learning resources are held primarily in electronic form"

which was later redefined in 1994 to:

"a managed environment of multimedia materials in digital form, designed for the benefit of its user population, structured to facilitate access to its contents and equipped with aids to navigation of the global network".

It is envisaged that the electronic library would be an environment in which:

- Expenditure on printed holdings as a proportion of total expenditure on information will steadily decrease.
- Expenditure will be increasingly capital intensive.
- Expenditure on information will shift from ownership to subscription and licence payment.
- Access to electronic holdings as a proportion of total information access will steadily increase.
- Balance of usage of buildings assets will shift from stockholding to networked study space.
- Networked end user information access from outside the library will steadily increase.

229

- Digital information will include text, still images, video and sound, both as raw information and also packaged as information products and learning materials.
- Job skills, training and recruitment would be re-profiled.

Buildings and Physical Space Usage

It should be noted that we do not envisage a disappearance of library buildings, but a reconfiguration of the usage of space. In an open and resource based learning environment the need for good quality high technology study space is likely to increase, and in a networked environment the size of an individual study space is likely to be greatest. The need for stockholding of current and active information in printed form will tend to decrease, although the need for stockholding of archive and research material in hard copy form will obviously remain. The opportunities for access to archives and research collections are however enhanced by digitisation, mirroring and networked access.

The buildings strategy which accompanied the digital library concept provides for a substantial programme of new building and refurbishment of existing facilities. The strategy strives to find a balance between space allocated to appropriate hard copy stockholding at any one time, the exploding need for study space and the developing capability of the electronic library to provide services. The strategy is based on the large networked study centre at Leicester which we mentioned earlier with a number of smaller electronic library facilities around our distributed campuses.

The Integration Challenge

As we have indicated our projects have tended to be focused on a particular aspect of electronic document delivery, or a particular format or standard. This was entirely appropriate in view of the need to make progress in the rather unstable arena of electronic library development. Also projects were designed to a certain extent in response to funding opportunities, particularly those emanating from the EU Third Framework Telematics programme for libraries which are focused on the development of tools and delivery mechanisms. Around the world it can be seen that a similar pattern is evident. There are several landmark projects which have been address-

ing electronic library problems, notably Carnegie Mellon, Cornell, Indiana, San Diego and Florida. In Europe the work of Tilburg and Delft is well known. This list is not meant to be definitive. These projects tend to be monothematic, for instance an electronic library for chemical journals, or music, or they are focused upon a particular technology or standard.

The challenge therefore for a university such as DMU, and I suspect, for any library wishing to develop a substantive digital library capability is to integrate standards, formats, delivery mechanisms and interfaces into an operational model which allows the user to access material from many sources, held locally and remotely, in a transparent manner irrespective of source and format. It is firmly our belief that the university digital library will be a combination of content held or mirrored locally and remote content accessed rapidly and conveniently by appropriately designed metadata. Data will increasingly be available in electronic form from the publisher, but there will remain for the foreseeable future a large amount of heritage information in libraries which will need to be digitised.

The De Montfort/IBM Digital Library Project

With these problems in mind DMU has recently agreed with IBM to carry out a joint research programme to develop an integrated digital university library. The programme is part of the Shared University Research Programme of IBM within which a few awards are made each year.

Functional Overview

As mentioned earlier DMU is already underway with preparing electronic repositories of information in a range of formats. For the pilot stage of our project we will cater for three basic groups of information:

- Images - using the ELISE framework
- Text - primarily in TIFF and PDF formats
- Text - in SGML format

Users will access the Digital Library after due authentication via a single integrated interface. The user will not be required to navigate through each database as if they were autonomous stores, but in the same way for each. Users will be able to submit queries to or browse through holdings. Images will be available at medium resolution so that performance is acceptable and higher quality images will be available in near-line robotic store. Images will be protected by watermarking and access to all holdings will be controlled by rights management procedures. The system will accept

231

queries that conform to the Z39.50 standard for text and images returning hits from the digital library and any other linked conforming databases.

Searching

As the Digital Library will comprise many formats the search and retrieve functions must support, in addition to conventional online searching facilities,

> metadata navigation
> image content retrieval (i. e. searching by shape, texture and colour)

Further down the track we will need to develop searching of video and sound. Multiple database searches will be transparent to the end user.

Storage and Data Migration

Because of the phenomenal amounts of data that will be stored there will be a combination of online high speed disk and near-line store held on a robotic tape library. Uncompressed scans of high resolution images can of course be archived off-line. Mirroring and migration of data from other sites will be a regular feature.

Rights Management

Although much information on the Digital Library will be unrestricted as to copyright there will need to be a full suite of facilities for rights management. De Montfort already has some product from its ELINOR project and will develop further facilities through ERCOMS, an eLib project. These will be integrated where possible with IBM facilities for authentication, watermarking and billing.

Architectural Model

De Montfort will take IBM's recently announced digital library architectural framework and associated products and use them to develop it's integrated approach. The platform will be a large IBM SP2 parallel processing supercomputer with eight nodes, of which six are dedicated to the digital library development programme. The SP2 configuration will consist of:

1 fat node for the Digital Library Server.
1 fat node for an image data object server and controller of a robotic tape library for near-line hierarchical storage.
1 thin node as an object server for text data and client gateway.
1 thin node as an object server for SGML.
2 thin nodes for other application development.

A Model for the Electronic University Library

The initial system will have 169 GB of disk storage and up to 1.4 TB of near-line storage.

In order to give an idea of the size and power of this configuration it is just under half the size of the machine which managed the Atlanta games Web Site which received several million hits per day. We envisage that the De Montfort system will hold around 2 billion images and receive a million hits per day when its web site is opened to the Internet.

The **Figure** shows that:

1. The digital library operates as web site on the University intranet here in the centre.

2. The web site is operated by the IBM supercomputer showing on the right the parallel processors as object servers and on the left the near-line robotic store and above the high speed store.

3. On the right are external databases specifically associated with the De Montfort Digital Library.

4. On the bottom right the Internet.

5. At the bottom middle the Clients.

6. And at the bottom left the scanning and printing sub-systems.

The above describes the planned architectural model. We envisage that the complete digital library model will comprise at least the following component models:

User model,
Functional model,
Data model,
Standards model,
Economic model.

233

Pilot phase with no outside access to DL for WEB clients

External Databases

Online Catalog

HELIX
ELISE II
SuperJournal
IDEAL
Knowledge Gallery
Tilburg

INTERNET/WEB

Router

Campus Intranet

IBM 7133
SSA High Speed Disk

DL System
OS/2 Admin

Windows Client

WEB Clients
(any browsers
e.g. Netscape)

De Montfort Digital Library
Pilot

SP2

DL
Client
DL
Client

Object
Server 2
Object
Server 3

Library Server

Object Server 1

Obj Server 1: Image
Obj Server 2: Journals
Obj Server 3: SGML

DB2/6000/ADSM
DL, AIX
C Set++
TCP/IP

IBM 3494
Tape Library
10 GB entry
up to 1.4 TB

IBM 7009, C2
RS/6000
SP Admin

n Scanners

Printing
Service

234

BEST COPY AVAILABLE

Libraries, Bibliographic Utilities and Library Networks: Looking ahead*

Ronald Michael Schmidt
Hochschulbibliothekszentrum, Cologne, Germany

Ronald Schmidt studied German language and literature as well as pedagogics. He began his academic career in 1977 as a research fellow in the field of Medieval German literary history and got his doctoral degree in 1980. Dr. Schmidt started his professional career as a librarian in 1982 working at the University Library of Bonn and since 1985 at Heidelberg University Library. Since 1990 he is head of the Department for Bibliographic Services at the Hochschulbibliothekszentrum des Landes Nordrhein-Westfalen at Cologne.

Abstract

Internet is an enormous challenge for libraries and library networks. Network technologies have an increasing impact on jobs and responsibilities within the information industry. Goals, tasks, and developments of library services will have to be re-engineered to match the demands of this rapidly changing marketplace. This paper describes a variety of tasks and products to be offered by bibliographic utilities or library networks to support libraries in migrating towards functions of a virtual library environment.

235

Internet is an enormous challenge for libraries and co-operative library networks. In future, jobs and responsibilities can no longer be described without referring to network technologies. If libraries decide to take up that challenge they need to start by placing this new medium at the centre of all deliberations about the future shape of library jobs and services in all areas. These services include what in Anglo-American libraries is known as technical services: acquisition and cataloguing activities.

At the back of the circulation desks, behind the curtains of reference services, acquisition librarians and cataloguers have always made their contribution to a functional and user-oriented library. In the area of library automation, it often has been the cataloguing departments who have taken the lead. However, integration with acquisition processes has so far lacked behind by the technical inadequacy of local library systems or bibliographic utilities. But ever since the beginnings of library automation in Germany there have been good attempts, so that cataloguing and acquisition at least have been based on a co-operative cataloguing as a common practise. The resulting library network in North Rhine-Westphalia e.g. is one of the largest by means of number of bibliographic records and holdings statements in Germany, and it is likely, that this "metadata resource" will have to migrate together with its client libraries towards the new horizons of libraries and librarians' tasks.

Providing an Infrastructure for Bibliographic Information Services

When decisions are taken about the development of new procedures requiring the active participation of those involved, the areas of work behind the scenes tend to be overlooked. This also applies to utilising resources accessible via Internet and their further processing to provide an information system for the support of librarians and their working processes. What is even more serious, in my point of view, is when these areas of work are not involved in helping to compile information on the World Wide Web (WWW). Information provided for users must be supplemented by information for librarians. Only if this new world is understood and accepted, it will release creative energy to migrate traditional working processes into a future virtual library. These human resources should be integrated in the developmental processes of change, librarians themselves must have the chance for active participation - otherwise we will readily be driven by technology and technocrats.

Acquisition librarians and staff cataloguing monographs and periodicals are dependent on the contact with library users, and they need to know what information is requested from libraries. They need ready access to booksellers' information, an easy opportunity to read and up-date work documentaries, and a readily available interface with other bibliographic resources. Staff cataloguing foreign language material need access to encyclopediae and dictionaries as well as authority data files also for remote languages.

Librarians responsible for sheet music collections or librarians in other special libraries or departmental libraries require information and communication systems tailored to their specific needs. For these requirements, bibliographic utilities may provide an infrastructure (today this would be a WWW package and an e-mail list) on the basis of which this information can be supplied to the librarians desktop in a clear way.

In future, due to the availability of information systems online it will increasingly be possible to do bibliographic research from the workplace. As a further advantage, information from such sources will always be up-to-date.

WWW technology provides an opportunity to create a personalised working environment. This may be done by writing one's own WWW page, where the kind of information called up most frequently may be adapted to one's own working methods. In this way, the Hochschulbiblio-thekszentrum's editorial staff's bibliographic research on Internet has led to the introduction of "bookmarks", which will be a very valuable source of information for anyone involved in this type of work. This page has already been incorporated into a bibliographic toolbox and thus is readily accessible for technical services staff from everywhere.

Tools for Information Retrieval in Libraries

Databases of bibliographic utilities will become far more comprehensive sources of information than has so far been possible by their present core products: catalogues plus data supply for storage in local online public access catalogues (OPACs). Tools for information retrieval in libraries are at present: library catalogues as inventories or instruments to account for the holdings of a particular library region by providing remote access to Union Catalogues.

237

Advanced information retrieval facilities provided by libraries in the future will have to be enhanced with an enrichment of the information on offer. This may include:

Cataloguing articles of journals and conference proceedings. In the context of document supply systems available this will be a useful element of OPACs, because the articles themselves may reach the user directly via hyperlinks on his demand.

Centralised resources for the documents themselves provided as pools by bibliographic utilities in a library network may support these value added services. Hyperlinks via WWW allow for a shared data provision for this category of literature: bibliographical data are provided locally and supplied by the library's OPAC, whereas the electronic documents to which they refer are supplied to the user on demand through the network, for example from central text servers of the libraries or utilities.

Enhanced cataloguing will be increasingly important in this context. It will be a valuable extra service of libraries: tables of contents, abstracts, subject matter indexes etc. will increase the information density of bibliographic descriptions and enable users to make a better judgement about the relevance of a particular document. Such activities require comprehensive support through the provision of the respective data resources on the server of the bibliographic utility.

Data sources for enhanced cataloguing activities are already available. They are on offer for an increasingly wide range of literature. Tables of contents may be requested from serials agencies as well as from the publishers themselves. The same applies to abstracts. The use made of those resources relieves libraries from data input work in many areas. This enables libraries to focus increasingly on material which will be outside the mainstream of services provided commercially.

Tools for linking these specific external data sets into the cataloguing process must be part of the future scope of functionalities of bibliographic utilities and local library systems. The "buzzwords" are Resource Sharing on Production, where in addition to the library's own cataloguing work it is possible to make extensive use of external resources by importing or linking them to the bibliographic records, and Copy Cataloguing, where enhanced cataloguing data are copied in full from external suppliers.

The technical tools to support such added value cataloguing activities are conceivable even today. They will be available in the follow-up system of

the Hochschulbibliothekszentrum as well as in many other library systems in the next future. What is needed to make effective use of these tools is the political will to provide this service by an extra effort of the technical services staff. Adjusting the ratio of copy cataloguing and original cataloguing tasks, which include the effective use of co-operative and remote data resources, may free the capacities to invest in an enrichment of information on offer to library users in-house and remote.

Enhanced Cataloguing for the University's Own Electronic Publications

Each electronic document catalogued in this way will lead to an improve-ment of retrieval precision on the Internet by providing enhanced metadata structures and quality. This will have a positive impact on electronic publications acquired by the library, for example from university depart-ments. If enhanced catalogue entries become part of the electronic docu-ment itself, in form of a copy of bibliographic data as a metadata set encapsulated within the file, this will also benefit retrieval systems on Internet other than one's own library catalogue. The efforts of libraries - assisted by bibliographic utilities - will not only be relevant for their own library catalogue, i.e. OPAC, but on a global level. The libraries' own OPACs as well as the utilities' OPAC will, however, be able to make the maximum use of enhanced bibliographical data and to provide users of these systems with a range of information tailored to their needs.

Providing Bibliographical Data for Retrospective Catalogue Conversion

Not all holdings in our libraries have so far been catalogued in machine-readable form. The integration of old university libraries into the library network in North Rhine-Westphalia in the late eighties and early nineties has shown that inputs from the libraries which were already connected to this system at that time were not yet adequate to allow for a satisfactory use of shared cataloguing procedures. To tackle such tasks, it will be necessary to provide additional bibliographical data resources to support retrospec-tive catalogue conversion.

As bibliographic data must also be allowed to originate from databases formatted differently - for German libraries i.e. MARC instead of MAB - there is a need to develop models for a co-existence of different biblio-

graphical formats within the utilities' databases. Only then it is possible to make economic use of international services and bibliographic databases. The work involved to modify such shared data by a German library must be kept to an absolute minimum.

In addition, specific retrospective catalogue conversion projects require specific tools which may be adapted easily to the profile of the material to be converted in a given library. That means that future library software supporting bibliographic utilities or library networks must provide flexible data conversion and format conversion capabilities.

Infrastructures for the Storage and Provision of Electronic Publications

In future, libraries will not only provide bibliographical information, enhanced by enriched cataloguing, but will also integrate the electronic documents themselves into their OPAC services. This will include full text data, starting with university publications, electronic publications on CD-ROM, pre-prints, and possibly - via suitable interfaces - Internet documents such as expert or general information and subject trees or their follow-up systems. The bibliographic description of documents in a library catalogue will then be supplemented by the documents themselves, provided that they are machine-readable. In this way, we are moving closer to an electronic library.

Electronic documents other than text-based material create far greater difficulties, however. This is due both to their unclear status within the range of information provided by libraries and our lack of practical ideas on how this may be realised technically. I am referring to a category of multi-media documents where text, picture, film and sound are integrated within one document.

If at all today, such a link-up between bibliographic information and document may be set up for photographic archives. However, digitised pictures take up an enormous amount of storage, and their transmission via networks is still unsatisfactory. Nevertheless, this may be an opportunity for the cataloguing of special holdings - this task would probably fall to special libraries who tend to own such material rather than the big universal libraries found as main libraries on campuses. It would then be possible to distribute photographic archives with historically precious material electronically to a large number of recipients without the risk of the material being damaged in use.

High-value holdings of rare book material can be catalogued by including digitised copies of the title pages. The Herzog August Library in Wolfenbüttel has been operating such a system to supplement the catalogue since the late eighties. Today such information can be made available independent from local systems via the networks. Bibliographic utilities can be of great assistance in addressing the technical problems of storing and archiving this material and relieving libraries from this tasks.

At the moment it is still difficult to integrate the other types of media mentioned above or multi-media products in general into the network. It is certain, however, that we must be able to catalogue them, make them available and archive them like we already do with the books. This must be seen as great challenge for the next few years.

These prospects are only conceivable if the OPAC is not seen only as a modern successor to the library catalogue confined to the library itself. Access to OPACs will be increasingly from outside the library. The boundaries between the cataloguing of library holdings and the cataloguing of information will be more diffuse than today; in my opinion, they will vanish completely when networks have reached a certain technical capacity. A library catalogue without the possibility to access the documents listed makes no sense in the future. This is a trivial but nonetheless important fact.

A Virtual Storage Library as a Service of the Bibliographic Utilities

The networks integrating libraries and utilities must take account of this development. I have already indicated that this must have consequences for workflow procedures in a library. From the utilities' point of view, the problems concern infrastructural areas such as storage, archiving, and provision of documents to the local library systems or to end users directly.

Virtual storage libraries for electronic texts can already be set up. The bottlenecks are the networks' bandwidth and the resulting poor performance when these documents are transmitted online to the user. In order to address this problem it will be necessary to consider the frequency of use of each document and the actual amount of documents called up on a given day in a regional library network. Network technology at hand can handle large amounts of electronic documents as long as there is no question of large numbers being accessed frequently. Enhanced retrieval precision would lower the transmitted noise considerably.

241

As the libraries' main service institutions, it makes sense for bibliographic utilities to set up the prime storage systems for such archives, thereby reducing maintenance of this technology to a minimum. If networks can handle the workload this model is likely to be the most economical, both in terms of hardware investment and in terms of maintenance personnel costs.

Where overload problems arise due to the insufficient network bandwidths, these servers will have to be mirrored in order to make simultaneous and synchronised use of several servers. In providing the required infrastructure, bibliographic utilities will enable libraries to pursue active organisation and acquisition policies for electronic documents, even if they have little or no local infrastructures of their own. In this way, the libraries' decisions will be dependent on their own creativeness rather than on the technical staff and know how available locally.

I am aware that on the basis of the present software packages in use by local library systems it may be difficult to foresee this trend of enhanced OPAC functions. However, the problem needs to be addressed if libraries do not want to be handicapped by the stigma of high-pitched ambitions which are unpracticable and hence unrealistic because not supported by some piece of outdated software or hardware. We will have to find models to continuously upgrade existing systems to fit to future demands, and we will have to find models for funding this task.

Interim solutions may point to the way ahead of us. By omitting some user functions which cannot be put into operation fully at present it may be possible to generate WWW-OPACs which will transmit at least the information provided by libraries - linked to electronic documents and other information accessible via hyperlinks this will certainly be an attractive product. In combination with the storage systems which I have described as a service of the bibliographic utilities it will be possible to make considerable progress in this area. A small number of examples of WWW-OPACs are operational and show that initial steps have been made into this direction.

Extending Storage Systems to Non-Text Based Documents

Bibliographic utilities will, in future, need to offer the specific storage and cataloguing systems required by electronic documents which are not text-

based and whose access modalities are more specific: photographic, sound and film archives - if I may look that far ahead - and other materials in the context of the library's acquisition and cataloguing work.

This will also be relevant for data in the area of future preservation projects which will utilise digitalisation rather than microfilm technology. At the moment it would require vast storage capacity to digitise these materials, but the state-of-the-art will progress quickly, so that this will be possible in the not too distant future. A few projects of this kind have been launched some years ago in the area of museum and archive work.

Microfilms have already been made of a great number of documents especially from precious rare book holdings or valuable newspaper collections, only to mention a view. If these existing microfilms were to be digitised a considerable amount of valuable library stocks could be made available also to users from outside the reading rooms. In future, it will no longer be necessary to read these films using the microfilm equipment in the respective library or to put up with the frequently unsatisfactory copy on a readerprinter, but the research can be done at one's own desktop by accessing the remote files on one's workstation.

On the basis of this fund of information and documents, the humanities, too, would have increasing network access to research sources which at present are difficult to penetrate. Facsimiles would be replaced by digitised facsimiles, and I am sure that these will be able to perform their function to a standard which is comparable to that of the present microfilms.

A Centralised Archive Library for Electronic Documents of the Libraries

Servers for electronic documents will no longer need to be installed locally when the use of these documents decreases. Then it will be possible to file these documents on "deeper" levels of the bibliographic utilities' storage facilities - infrastructures for network access will, of course, ensure that local and remote users continue to have access to such data. In addition, libraries will be relieved from the job of archiving these materials. This concept of a "virtual storage library for electronic material" may also serve as a shared national data resource for this material.

Although Die Deutsche Bibliothek will take up the job of providing a document storage facility for electronic documents as part of legal copy acts

243

- the organisational side of this is already being considered -, this institution will certainly not be able to be the sole supplier of documents. Furthermore, the regional legal copies need also to be integrated in this meshwork of document resources, and it might also be useful to have them being stored on a centralised storage system of the regional bibliographic utilities. The infrastructure provided by these utilities must be part of a model of resource sharing, which optimises local storage capacities and network loads and adapts them to the actual requirements.

Bibliographic Utilities as Centres of Future Document Supply Systems

Centralised databases - i.e. Union Catalogues - have been ideal tools for the automation of document supply. In the near future, it will also be possible to link up bibliographic utilities via standard interface facilities to form interregional clusters: inquiries will then be exchanged according to effective routing algorithms between the utilities. As the utilities' services are being developed further, this area will have to be given priority.

Bibliographic utilities will provide libraries with document delivery systems which can integrate both the library networks' own resources and data from external resources, such as commercial suppliers. The clustering of these utilities which will be possible via standardised interfaces and protocols will create a nation-wide network of regional centres which will make use of both existing and new channels of distribution to meet the challenge of delivering information direct to the user's desktop.

Although I personally do not feel comfortable with the thought of having to issue books on an "immediate" basis via some sort of mail-ordering, I am sure that this is a trend which will continue. In due course, ILL and direct document delivery procedures, which ensure that the distribution mechanisms take account of the actual frequency of use or workload of the participating library by utilising a straightforward successor of the Union Catalogues based on the utilities databases of regional holdings, may prove to be a worth-while and important service. Document supply systems for journal articles scanned in are already operational. It will be necessary to develop them further and to optimise organisation procedures alongside.

Research and Development as a Prominent Task for Bibliographic Utilities

In Germany, research and development has so far been neglected as a responsibility for bibliographic utilities. The requirements of a future-oriented library work can only be fully met through synergetic action by all parties concerned. Research and development in the area of new procedures, both technical and administrative, require an effective and synchronised use of all human resources available. Therefore, action must be taken soon to concentrate such work within the bibliographic utilities. Therefore, there is a need to take political decisions and to promote structural changes, so that efficient working groups can be established within the bibliographic utilities. This would lead to a consultancy service for member libraries supporting both, technical and administrative changes.

The variety of technology used to assist libraries in their work and to satisfy the changing information needs of users creates a requirement for a consulting body. Unlike in most libraries in the Anglo-American world, consulting has so far been unusual in German libraries. At present, budgets make no provision for consulting services of third parties. Therefore, a central organisation should be established to meet this requirement, and it would make sense to locate this organisation within the bibliographic utilities.

As the state-of-the-art progresses at an ever faster pace, this must be followed up by enhanced central services. Libraries must be relieved from redundant production areas by outsourcing them to the regional utilities and be given scope for a future-oriented library work as prominent information agencies.

Research, development and consulting must be coupled with suitable training opportunities. We must be given the means to catch up with the progress rather than lagging behind. If we succeed in fulfilling this task more adequately, this will be a great achievement.

Agony and Ecstasy of the Internet: Experiences of an Information Scientist Qua Publisher

Eugene Garfield
ISI®, Philadelphia, Pennsylvania, USA
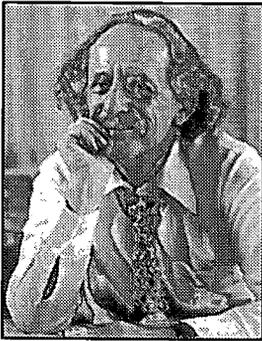
Dr. Garfield is founder and Chairman Emeritus of the Institute for Scientific Information®. He is the inventor of the Science Citation Index®, Social Sciences Citation Index® and Arts & Humanities Citation Index®. Since 1986, Dr. Garfield has been publisher and regular columnist for The Scientist®, a bi-weekly newspaper for the life sciences professional. Dr. Garfield's education includes a BS in Chemistry and an MS in Library Science from Columbia University and a Ph.D. in Structural Linguistics from the University of Pennsylvania. He has lectured widely and is the author of numerous papers on information science. He is author of a 15 volume series titled Essays of an Information Scientist as well as Citation Indexing - Its Theory and Application to Science, Technology, and Humanities.

Abstract

Over three years ago, the bi-weekly newspaper The Scientist® was mounted on the NSFnet and has been available worldwide on the Internet ever since. Recently it has migrated to the World Wide Web. The two systems will be compared with specific examples. Future Internet success will depend upon innovative display and visualization techniques as well as real time access and highly specific search engines. Using the Internet for selective dissemination of information will be discussed by comparing searches on

Alta Vista to searches by CD-ROM. Future current awareness and SDI systems (<u>Current Contents</u>®, <u>Research Alert</u>®) will be linked to electronic journal libraries. Cited reference searching, a variant of hyper-text searching, will be discussed with respect to <u>SCI</u>® and Web crawlers.

When I learned that my good friend Ahmed Helal was retiring, I could not fail to respond to his invitation to participate in this 19th International Essen Symposium. So I was glad that it was acceptable to this library-oriented group to speak about my experiences as a publisher on the Internet. You might say that I am the co-publisher with the University of Pennsylvania where the database resides. Ann Okerson, Steve Harnad, and others have forecast that would be the ultimate fate of scholarly publication but that kind of migration from private to university publishing has been quite limited.[1, 2]

The Internet is a mixed-bag. It produces considerable frustration but also occasional exhilaration. It suffers not only from information overload and redundancy but also lacks real time access. The delay you encounter in accessing most URLs is somewhere between bearable and intolerable. As I'll demonstrate later, until we have real time access to the URLs identified by Web crawlers such as Alta Vista, Lycos, etc., frustration will prevail.

Gopher as KWIC Index

Last year at an American Chemical Society meeting, I described the electronic version of *The Scientist*, the newspaper that I've published for 10 years. When we started that Gopher file three years ago on NSFnet, it was kind of gee-whiz - isn't that wonderful? By the time we launched our Web site at the University of Pennsylvania over two years later, the Gopher file at AT&T already left something to be desired including its strict chronological order.

```
GOPHER MENU

Keyword Search of The Scientist Newsletter
QUESTIONNAIRE
-ls
README
help1

index-the-scientist
jobs-the-scientist-960318
jobs-the-scientist-960401
jobs-the-scientist-960415
jobs-the-scientist-960429
jobs-the-scientist-960513
jobs-the-scientist-960527
```

```
ls-ls
overview
the-scientist-900108
the-scientist-960108
the-scientist-960122
the-scientist-960205
the-scientist-960219
the-scientist-960304
the-scientist-960318
the-scientist-960401
the-scientist-960415
the-scientist-960429
the-scientist-960513
the-scientist-960527
the-scientist-960610
the-scientist-960624
the-scientist-960708
the-scientist-960722
the-scientist-960819
the-scientist-960902
```

Slide 1: Gopher Menu for *The Scientist*

```
=========================================================
THE SCIENTIST                        SEPTEMBER 2, 1996
VOLUME 10, No:17
(Copyright, The Scientist, Inc.)
=========================================================
```
                          NEWS

Schools of Public Health Adapting To Societal Needs
SIDEBAR : Accredited Schools of Public Health

AN OUNCE OF PREVENTION: As managed care, with its focus on
preventive medicine, revolutionizes health care, many
universities are expanding their public health programs,
incorporating many disciplines to better adapt to the
changing environment   1

Fired Whistleblower's Successful Appeal May Broaden State
Protection Statutes

ONE WHISTLEBLOWER'S VICTORY: Myron Mehlman wins an appeal
and $7 million from Mobil Oil Corp., which dismissed the
toxicologist after he advised a Japanese subsidiary to stop
selling gasoline with hazardous levels of benzene, in a case
that could expand protection for those who speak out against
corporate wrongdoing   1

Six Scientists Are Added To Ranks Of Prestigious MacArthur Fellows

JOLLY GOOD FELLOWS: Six scientists recognized for their
cutting-edge interdisciplinary research have been inducted
into this year's class of MacArthur fellows   1

As MacArthur Fellowship Turns 15, Recipients Reflect On Its Impact

MUSINGS ON THE MacARTHURS: The MacArthur Fellowship program
marks 15 years of awarding cash prizes and research freedom
to many scientists, some of whom reflect on how the
out-of-the-blue award changed their lives   3

                         OPINION

Medicine, Science, Public Health Must Merge For The Greater Good

RESTORING PUBLIC HEALTH: Schools of public health must
incorporate scientific disciplines into their agenda to
effectively protect the greatest number of people, contends
Joshua Lederberg, the Raymond and Beverly Sackler Foundation
Scholar at Rockefeller University, in an essay adapted from
a recent commencement address 10

Affirmative Action And Women In Science: Post Hoc, Ergo Propter
Hoc?

Slide 2: *The Scientist* Gopher contents page, September 2, 1996

Here for example is a sample WAIS search on combinatorial chemistry.

gopher://ds0.internic.net:70/7waissrc:/pub/the-sc

Gopher Search

This is a searchable Gopher index. Use the search function of your browser to enter search terms. Enter search keywords: COMBINATORIAL CHEMISTRY

Gopher Menu

```
TI: The First Combinatorial Library    AU: Jack D. Keene    DT: August 19, 19
TI  :   CELL BIOLOGY   TY  :   RESEARCH (HOT PAPERS)  PG  :   16   S.A.
TI: CATALYTIC ANTIBODIES NEED TO BE FASTER, MORE PLENTIFUL   AU: DIANA MORGAN
TI:                        CONTENTS   DT: April 2, 1990  PG: 2    (The Scientist.
TI : Combinatorial Chemistry    DT : July 8, 1996  PG : 14  TY : Research (Hot P
TI: CHEMISTRY   AU: RON MAGOLDA  Medical Products Department  E.I. Du Pont de N
TI   :   MOLECULAR BIOLOGY   TY  :   RESEARCH (HOT PAPERS)    PG  :   17
TI :                     CONTENTS  DT : May 13, 1996  PG : 3
TI: Managed Care And Research   AU: Gary L. Steinman   DT: August 19, 1996
TI: PEOPLE BRIEFS   DT: June 11, 1990  PG: 27  TY: PROFESSION   (The Scientist
TI: BIOCHEMISTRY   DT: September 3, 1990  PG: 17  TY: RESEARCH    (The Scientis
TI :                   CONTENTS  PG : 3    (The Scientist. Vol:10, #14, pg.1,
TI:                    CONTENTS   DT: August 19, 1996  PG:  3
TI: Life Sciences   AU: SIMON SILVER  Department of Microbiology  & Immunology
TI: PATENT OVERLOAD IN MONOCLONAL ANTIBODIES   AU: ELIZABETH PENNISI   DT: Ap
TI : MOLECULAR BIOLOGY   DT : January 21, 1991  PG : 14  TY : RESEARCH (HOT PAP
TI: Combinatorial Libraries: A New Fast Track To Monoclonals   AU: RICKI LEWIS
TI: LANDMARK IN IMMUNOTOXINS, 1980-1989: SELECTED PAPERS   DT: April 2, 1990  P
TI  : Despite Recent Layoffs, Biotechnology Industry Is Far        From Dead
TI: Landmark Biotech Research Began With A Seaside Stroll   AU: RICKI LEWIS
TI : Drug, Biotech Firms Beginning To Embrace     Combinatorial Chemistry
TI:  Eight Researchers Accept The National Medal Of      Science For 1996   A
TI: Three Companies Bet Their Futures On Catalytic          Antibodies' P
TI: Changing Disciplines Can Offer Personal And      Professional Satisfaction
TI: Genetic Engineers Vitalize Monoclonal Antibody Arena   British and U.S. sci
TI  : Starting Up: What's Attractive To Biotech Investors?   Industry observers
```

Slide 3: Gopher Search via WAIS on "combinatorial chemistry" on top of slide and menu of results on bottom

The presentation for a keyword search is reminiscent of the KWIC indexes developed by Herb Ohlman at Systems Development Corporation (SDC) and Peter Luhn of IBM in the late 1950s. You would think that AT&T could come up with something a little more sophisticated than a KWIC index display.

In the next series of slides, we have the corresponding displays for the Web site, which does provide reverse chronological order.

THE SCIENTIST®
The Newspaper For The Life Sciences Professional

August 1996
　　August 19, 1996 Volume 10, No. 16
July 1996
　　July 22, 1996 Volume 10, No. 15
　　July 8, 1996 Volume 10, No. 14
June 1996
　　June 24, 1996 Volume 10, No. 13
　　June 10, 1996 Volume 10, No. 12
May 1996
　　May 27, 1996 Volume 10, No. 11
　　May 13, 1996 Volume 10, No. 10
April 1996
　　April 29, 1996 Volume 10, No. 9
　　April 15, 1996 Volume 10, No. 8
　　April 1, 1996 Volume 10, No. 7
March 1996
　　March 18, 1996 Volume 10, No. 6
　　March 4, 1996 Volume 10, No. 5
February 1996
　　February 19, 1996 Volume 10, No. 4
　　February 5, 1996 Volume 10, No. 3
January 1996
　　January 22, 1996 Volume 10, No. 2
　　January 8, 1996 Volume 10, No. 1

December 1995
　　December 11, 1995 Volume 9, No. 24
November 1995
　　November 27, 1995 Volume 9, No. 23
　　November 13, 1995 Volume 9, No. 22
October 1995
　　October 30, 1995 Volume 9, No. 21
　　October 16, 1995 Volume 9, No. 20
　　October 2, 1995 Volume 9, No. 19
September 1995
　　September 18, 1995 Volume 9, No. 18
　　September 4, 1995 Volume 9, No. 17
August 1995
　　August 21, 1995 Volume 9, No. 16
July 1995
　　July 24, 1995 Volume 9, No. 15
　　July 10, 1995 Volume 9, No. 14
June 1995
　　June 26, 1995 Volume 9, No. 13
　　June 12, 1995 Volume 9, No. 12

Gopher version of The Scientist, containing issues from 1992 to the present.

Slide 4: Web Contents, June 1995 to August 19, 1996

THE SCIENTIST®

Sections

Web Contents
Web Search
Gopher Version
Gopher Search

News
Opinion & Letters
Research
Hot Papers
Profession
Tools
New Products
Advertisers
Notebook
Cartoons
Clarifications
Crossword Puzzles
Jobs/Meetings/Symp

Web Statistics

Current issue Volume 11, No. 1, January 6, 1997

Stories in this Issue

- Kessler Resignation Sparks Concern About Future Of FDA
- Few Natural Science Classes Affected By Teaching Assistant Strike In California
- Biotechnology Turns To Ancient Remedies In Quest For Sources Of New Therapies
- Controversial Group Marks Quarter-Century Of Fighting For NIH Women Scientists' Rights
- Amid War, Scientific Publication Survives In Former Yugoslav Republics
- Scientists Can Advance Research By Joining With Patient-Advocacy Groups
- Despite Changes In Benefit Plans, Retiring Scientists Still Have Options
- Harold Kroto Contemplates Applications Of Nobel-Winning Fullerenes
- Geneticist Frederick W. Alt and microbiologist Guillermo Taccioli discuss a DNA-dependent protein kinase enzyme, a component of the DNA double-strand break repair system
- Neurologist Julie A. Bennett-Desmelik reports on the topology of the glutamate receptor.
- Liquid Handling Equipment Evolves To Suit Large-Scale Applications

Notebook:

- Jobs, Symposia, Grants
- ...And more...

- More Reviews of Peer Review
- Tenure Lives, For Now
- FASEB: NIH Deserves More
- Scientist At the Helm
- A Piece of Mars For Sale
- Why Menstruate
- Bacteria-Fighting Buckyballs
- "Grande Dame" Dies

Slide 5: Listing of "stories in this issue" for August 19, 1996

VOLUME 10, No:16

THE SCIENTIST®

The Newspaper For The Life Sciences Professional

August 19, 1996

NEWS

Merger Mania Hits Med Schools, Prompting Scientists' Anxieties
Author: Myrna E. Watanabe, pp. 1, 4-5
WILL THE AX FALL? When hospitals merge to compete in a changing health care market, job security and research funding become major issues, particularly in the case of the proposed merger between Mount Sinai Medical Center and New York University Medical Center, which also plan to combine their medical schools.

Decision In Imanishi-Kari Appeal Spurs Call For Changes In System
Author: Billy Goodman, pp. 1,6-7
APPEAL AFTERMATH: As the dust settles after Thereza Imanishi-Kari's exoneration in a decade-long scientific misconduct case, observers are calling for an overhaul of the system for dealing with such charges.

Reports Give Boost To Xenotransplantation As Researchers Wait For Federal Guidelines
Author: Robert Finn, pp. 1,8
GREEN LIGHTS FOR XENOTRANSPLANTS: Two independent reports say that research on the transfer of organs and tissues from animals to humans should continue since the potential benefits of the procedure outweigh the risks.

Veterinary Medicine Begins To See Effects of Biotechnology Boom
Author: Kathryn S. Brown, pp. 1, 9
OF DNA AND DOGS: Scientists realize career alternatives to human-health research as biotechnology makes inroads in the animal health market

Eight Researchers Accept The National Medal of Science for 1996
Author: Thomas W. Durso, pp. 3, 10
SCIENCE MEDALISTS: The National Medal of Science was awarded to eight researchers, including two life scientists, last month.

OPINION & COMMENTARY

Animal-Rights Movement's "Bible" Contains Distorted Revelations
Author: Adrian R. Morrison, pp. 11
DEBUNKING THE 'BIBLE': False allegations about mistreatment of animals in Animal Liberation, the 1975 book by Australian ethicist Peter Singer that inspired several anti-research organizations to take action, is still affecting science and government policy, contends Adrian R. Morrison, a professor of behavioral neuroscience at the University of Pennsylvania.

Slide 6 and 7: **Complete contents page for August 19, 1996 including short abstracts**

253

An Old Proposal For A New Profession: Scientific Reviewing
Author: Eugene Garfield, pp. 12.
Reviewing, a demanding task that presents a noble challenge, should be encouraged as much as research by the scientific community, according to Eugene Garfield.

LETTERS

"Managed Care And Research," by Gary L. Steinman;

"The First Combinatorial Library," by Jack D. Keene;

"Legal Consulting," by Ronald D. Hood

RESEARCH

Psychoneuroimmunology Finds Acceptance As Science Adds Evidence
Author: Steven Benowitz, pp. 14-15.
MATTERS OF THE MIND: Psychoneuroimmunology, the study of the interaction between the brain and the immune system, is gaining acceptance in the mainstream medical world as evidence mounts that the mind does indeed affect overall health.

HOT PAPERS

Clinical researcher Edward M. Connor details his study reporting that the drug zidovudine helped reduce maternal-infant transmission of HIV-1 by almost 70 percent; Biophysicist Mark Gray-Keller explains the change in intracellular calcium that accompanies the light response in isolated rod photoreceptor cells.

PROFESSION

How To Spur Scientific Revolution: Amass Copious Data, Keep It Simple
Author: Karen Hopkin, pp. 18
DEPOSING THE DOGMA DU JOUR: That crazy theory that explains all your research findings may not fit today's scientific models, but that doesn't mean it's not valid; researchers who have struggled to gain acceptance and funding for their ideas urge persistence.

TOOLS & TECHNOLOGY

Scientific Publishers Increasing Electronic Information Offerings
Author: Robert Finn, pp. 19-20
ELECTRONIC SCIENCE: Scientific publishers are offering more products-including journals, databases, bibliographic abstracts, and full-text articles-on CD-ROM and the World Wide Web.

Slide 6 and 7: Complete contents page for August 19, 1996 including short abstracts

THE SCIENTIST®

The Newspaper For The Life Sciences Professional

Result of Search

Search for: **combinatorial chemistry**

Pages with Number of References

1. Drug, Biotech Firms Beginning To Embrace [22]
2. Combinatorial Chemistry [4]
3. Immunological Applications Top List Of [3]
4. CELL BIOCHEMISTRY [3]
5. New Technologies And Approaches Spur Industry Interest [3]
6. Opinion (Letters): The First Combinatorial Library [3]
7. Industry Investors Show Increased Interest In [3]
8. Liquid-Handling Equipment Evolves To Suit Large-Scale Applications [2]
9. 'Merger Mania' Among Drug Firms Raises Concern About [2]
10. Biotechnology Turns To Ancient Remedies In Quest For Sources Of New Therapies [1]
11. Changing Disciplines Can Offer Personal And Professional Satisfaction [1]
12. User-Friendly Software Makes Molecular [1]
13. Pharmaceutical And Biotech Firms Taking On [1]
14. Molecular Parasitology: A Decade Of Detailed Study [1]
15. Today's Peptide Chemists Face A Dizzying Array Of [1]

THE SCIENTIST®

The Newspaper For The Life Sciences Professional

Result of Search

Search for: **molecular modeling**

Pages with Number of References

1. User-Friendly Software Makes Molecular [13]
2. Molecular Modeling [3]
3. Pure And Simple: Chromatography A Vital Tool In [1]
4. Naval Lab 'Experimentalist' Honored With Bower Award [1]

Slide 8: Searches on Web site on "combinatorial chemistry" (top) and "molecular modeling" (bottom)

Three years ago, I was glad to be able to do a search at all, so a KWIC display was acceptable. Now even this more attractive looking display [provided through the University of Arizona's Glimpse search engine at Penn], while an improvement, still leaves room for improvement when there are more than three or four hits.

Most search engines are unforgiving. Once you create a file, special programming is needed to include in the display information like the date of issue, unless you are prepared to re-index every document.

To illustrate how you proceed from the first stage of a search to the next, I've done a search on "technology transfer."

THE SCIENTIST®
The Newspaper For The Life Sciences Professional

Result of Search

Search for: **technology transfer**.

Pages with Number of References

1. University Technology Offices Focus Effort On Overcoming 950612 [11]
2. USING THE INTERNET FOR TECHNOLOGY TRANSFER 950612 [9]
3. Michigan State University Patent Dispute Illustrates Changes 951030 [8]
4. Research Parks Forming Strategies To Adapt To End 960708 [4]
5. The Road To University Technology Licensing Is Littered 950918 [3]
6. Observers See Ominous Trend In '96 Science Budget 951016 [3]
7. NIH 'Reinventing' An Expanding SBIR Program 961028 [2]
8. President Clinton's Science Policies Draw Cheers, Jeers From Observers 961014 [2]
9. Clinton Administration Seeks New Model For Applied Research 950724 [2]
10. Limited Access To cDNA Database Has Drug 941212 [2]
11. Gerontologist's Provocative Question -- Does NIA Spend 960219 [1]
12. Merger Mania Hits Med Schools, Prompting Scientists' 960819 [1]
13. Industry Investors Show Increased Interest In 960401 [1]
14. Legal Tussle Over cDNA Libraries May Stall Gene Sequence 951002 [1]
15. THE LEADERS OF SCIENCE : THE READERS OF THE SCIENTIST 951113 [1]
16. National Labs' Future In Jeopardy 951127 [1]
17. OPINION - Exclusion Of Diversity And Creativity Impedes Scientific Innovation 951127 [1]
18. MBA Programs Expand Career Prospects For Cross-Trained 950626 [1]
19. Genome Investigator Craig Venter Reflects On Turbulent Past 950724 [1]
20. Environmental Scientists Hail New Forest Service Chief 940110 [1]

Slide 9: Search done on "technology transfer"

In the next slide, I've called up hit #2 "Using the Internet for Technology Transfer".

USING THE INTERNET FOR TECHNOLOGY TRANSFER

Author: Lee Katterman

Several universities have turned to the Internet to help promote the inventions of their faculty. In some cases, universities have provided searching capability, permitting the Internet browser to display nonproprietary descriptions of inventions available for licensing. Here are the URLs (Universal Resource Locators, also known as "addresses") that turned up during some recent "Net-surfing."

1. Indiana University Technology Transfer Office *at* http://www.indiana.edu/~techtran/index.html
2. University of Michigan Technology Management Office *at* http://www.tmo.umich.edu/
3. Michigan State University Division of Engineering Research *at* http://web.egr.msu.edu/~gleasonb/index.htm
4. Massachusetts Institute of Technology Technology Licensing Office *at* http://web.mit.edu:1962/tiscrve.mit.edu/9000/24442.html
5. Ohio University Virtual Technology Transfer Office *at* http://ra.cs.ohiou.edu/gopher/non-academic/tto/vlohome.html
6. Penn State Research and Technology Transfer Organization *at* http://infoserv.rttonet.psu.edu/rtto.html
7. Rutgers University Office of Corporate Liaison and Technology Transfer*at* http://info.rutgers.edu/Services/Corporate/corporate/
8. Stanford University Office of Technology Licensing *at* http://www-leland.stanford.edu/group/OTL/ aboutotl.html
9. State University of New York, Stony Brook,Office of Technology Transfer *at* http://www.research.sunysb.edu/research/techxfer.html
10. University of Washington Office of Technology Transfer *at* http://cary.u.washington.edu/ott/ott.html
11. United States Patent and Trademark Office *at* http://www.uspto.gov/
12. A list of URLs of patent information sources collected by Ohio University *at* http://ra.cs.ohiou.edu/gopher/non-academic/tto/patents.html
13. A list of URLs of university, government, andprivate organizations involved in technology transfer *at* http://cary.u.washington.edu/ott/TechTransfer.html

(The Scientist, Vol:9, #12, pg.10, June 12, 1995)
(Copyright, The Scientist, Inc.)

WE WELCOME YOUR OPINION. IF YOU WOULD LIKE TO COMMENT ON THIS STORY, PLEASE WRITE TO US AT EITHER ONE OF THE FOLLOWING ADDRESSES:

garfield@aurora.cis.upenn.edu
71764.2561@compuserve.com

The Scientist,
3600 Market Street, Suite 450, Philadelphia, PA 19104
U.S.A.

Slide 10: Article by Lee Katterman shows 13 hot-linked connections

First entry (Hit #1) is for Indiana University's "Technology Transfer Office." That takes us to their home page (**Slide 11**).

Technology Transfer at Indiana University

501 N. Morton Street, Suite 111
Bloomington, IN 47404

Telephone 812/855-7842 Facsimile 812/855-3757

Technology Transfer Office

Technologies

Newsletter

ATAIN, Inc. Alliance

BioPharm Internet Resources

Slide 11: Home page of Indiana University's Technology Transfer Office

As I said, if you plan ahead your webmaster can create more attractive and useful displays. Here, for example, is the result of a search on "Hot Papers." This was one of the categories shown previously on our contents page in **Slide 5**. The dates have been included as separate headings in the redesign.

THE SCIENTIST®
The Newspaper For The Life Sciences Professional

Hot Papers

August 19, 1996

- Clinical researcher Edward M. Connor details his study reporting that the drug zidovudine helped reduce maternal-infant transmission of HIV-1 by almost 70 percent.
- Biophysicist Mark Gray-Keller explains the change in intracellular calcium that accompanies the light response in isolated rod photoreceptor cells.

July 22, 1996

- Geneticists James R. Burke and Jeffery M. Vance explain their search for the chromosomal mutation that causes the neurodegenerative disorder known as Haw River Syndrome
- Molecular biologist Andreas Batzer describes the binding sites for the proteins Grb2 and Shc on the epidermal growth factor receptor

July 8, 1996

- Geneticist Kenneth H. Buetow explains one of the first attempts to integrate PCR and RFLP markers into human genome maps
- Chemist Mark A. Gallop discusses applications of combinatorial chemistry in drug discovery

June 24, 1996

- Cellular biochemist Thomas Söllner reports on a protein-receptor complex required for targeting specificity to vesicular transport
- Cell biologist Lewis C. Cantley discusses development of optimum motifs for several Src homology region 2 domains of enzymes

June 10, 1996

- Geneticist James M. Wilson discusses how to circumvent immune reactions when testing gene therapy for cystic fibrosis
- Pathologist Richard J. Cote describes antigen removal, a new technique to enhance tissue staining that makes immunohistochemistry results easier to reproduce.

May 27, 1996

- Telomere Biology: Cell biologist and neuroscientist Jerry Shay reports on association of human telomerase activity with immortal cells and cancer.
- Plant Disease Resistance: Agricultural biotech researcher Bernard Vernooij discusses salicylic acid's role on the development of systemic resistance in plants.

May 13, 1996

- Medical researcher Richard Steinman reports on the p21(WAF1) protein's role in triggering cell differentiation
- Cancer researchers Jeffrey Bluestone and Craig B. Thompson discuss the role of CTLA-4, an immune system protein

Slide 12: Hot Papers

259

When we agreed to put *The Scientist* on the NSFnet, we were frequently asked whether it wasn't dangerous to its survival as a subscription service. There is nothing in our experience that would confirm that expectation. As a strictly ASCII file, I was confident that few subscribers to the print edition would give up the pleasure and value of the printed edition. Three years later that situation has not changed and I still cannot really tell you yet how many people "read" *The Scientist* in electronic form. We receive statistics each month on the number of searches, etc. But one FTP could be serving the needs of every scientist in New Zealand. We've asked librarians or computer managers who FTP files if they have any idea how many people use or read *The Scientist* in its electronic version, but most really can't say. Everything is expressed in terms of searches and hits.

I had hoped that it would be possible to use the Internet in a pro-active way so as to improve the dissemination of *The Scientist's* articles to all relevant readers of listservers, bulletin boards, etc. So far it has proven to be too time consuming to attempt to identify all relevant bulletin boards for each new story or to correspond with the individual bulletin board monitors or editors. The rules of etiquette on the original Internet prohibited us from trying to send out a wide swath broadcast of the contents page of each issue. Even the now commercialized Internet has not changed the fact that unsolicited mail offends most scientists, particularly as information over-load has increased. Of course, individual readers, knowing of an article that would interest colleagues, can go up on our Web or Gopher sites to transmit that article.

Having *The Scientist* at my fingertips has saved us considerable time in responding to requests for information. This is a mixed blessing. Students worldwide seem to think we are authorities on any subject we have covered in a news story. Recently, someone asked for advice on how to obtain an MBA as part of his plan to switch from microbiology to management because we had published an article last year on cross-training in career development. We often receive desperate requests for advice on medical problems.

A recent experience with *The Scientist* editorial staff illustrates the cultural change that is involved in going from traditional indexes to electronic access. We have produced manual author and keyword indexes to *The Scientist* since its inception. These printed indexes cover 1986 to 1995. It is no longer urgent for us to produce this index on a fully current basis since we can access *The Scientist* by keyword on our Web site. When we

planned this year's budget in November we excluded the cost of the manual index. Then in May someone asked when it would be updated. The advantages of the printed index were cited. But when I asked how long it took to access the original stories they seemed perplexed. I pointed out that you had to take into account the time required to locate the article in the library. Long before you've found the issue in the library, you can display the article on the screen and if necessary print a copy. (Slide 13: *The Scientist* Subject Index - Highlight "technology transfer")[10]

In the time that remains, I would like to comment on my experiences with Web crawlers such as Alta Vista and make some random comments on Alta Vista, Dialog, and some other search methods. For example, a search on DialIndex for information on "technology transfer" produces a list of databases containing various items on that subject. (Slide 14: DialIndex search on "technology transfer")[10]

When you do a search on Alta Vista, you produce a list of URLs which may range from a computer host to a specific abstract. In a recent talk to NFAIS, Roger Summit pointed out that Alta Vista had 23 million "records" while Dialog gave you access to 334 million, half in science.[3]

I mentioned earlier the problems of delivering information to the editors of Internet bulletin boards. These editors could use one or more crawlers to find out what articles have appeared in *The Scientist* that concern the interests of their invisible colleagues. Of course, this means they have to create term profiles that will anticipate the varieties of natural and scientific language implied by their specialties. But they will be directed to the full text of articles, since each article is a separate URL. With Dialog they will be directed mainly to titles and abstracts within particular databases.

Electronic versus Printed Outputs

We have been hearing for quite some time how the Internet is going to displace the printed word. It used to be called the paperless society. But we are still consuming enormous quantities of paper to print our e-mail and Internet output. I for one can't sit for hours reading a screen. Even if I could, the portability of printouts is necessary for my mobile existence. I frequently see people in planes and trains using portable PCs, but somehow they never seem to be reading. We have a long way to go before the printed page is displaced. Are you ready to replace reading your morning paper with electronic access? The same reasoning may not apply to reading scientific

or scholarly journals. Some of them are so large that they defy easy browsing.

Future of SDI Systems

I continue to be an avid user of ISI's SDI system. The ISI® *Research Alert®* (formerly ASCA) has now been around for over 30 years[4]. It was the first commercially available SDI system. But for over 20 years it was unable to survive without the financial support of the *SCI®* database. Scientifically it was a success and continues to serve the needs especially of applied scientists. But for basic researchers it still has to be combined with scanning of journal contents pages. In fact, the success of *Current Contents* was, and still is, primarily due to the inability of most researchers to define their reading needs precisely. If they knew exactly what they needed, would research be necessary?

The quantity of information published today is much greater than it was 40 years ago when ISI started. Yet I can honestly say that 50% of what I read would not turn up in any ordinary keyword search. But that might change as the full-text revolution matures. ISI's *Research Alert* can now be delivered over the Internet, thereby making it more timely and also susceptible to further electronic manipulation. I've just begun testing this out myself since it includes abstracts as well as titles. (Slide 15: ISI Research Alert report)[10]

Cited Reference Searching

When I was more active in research, I literally scanned the contents of seven editions of *Current Contents*. As time passed, I increasingly relied upon the unique ability of cited reference searching via *Research Alert* to support my reading needs. Cited reference searching is simply a variant of hypersearching. It will be an integral part of the fully electronic journal world of the future. For the moment, however, it is not practical to use the Internet to find all articles which have cited your work, or some specific paper, book, or author - at least not without considerable effort.

A group at the University of Southampton in the UK is also developing what it calls linking databases.[5] Making journals and the *SCI®* and other databases transparent to each other in the near future is an increasingly realistic expectation. STN has already done this to some extent. ISI is

developing *SCI* Intranet capability which will eventually cover the entire file from 1945 to the present. ISI has already announced the use of the Internet for *Current Contents* and *Research Alert*. (Slide 16: Distributed Link Service in UK)[10]

Using today's Web crawlers to search for cited references is rather frustrating and time consuming.

When I did a simple search for my name on Alta Vista, using advanced query mode, the first 10 entries retrieved are quite relevant. And so is the 11th. But then you are directed to the Eugene, Oregon, Chamber of Commerce located on Garfield Street! (Slide 17: Alta Vista search on "Eugene Garfield" using the advanced query)[10]

Then at the bottom of the list there is a home page for the Cantrell family whose members include Eugene and Garfield Cantrell. Since then this adjacency problem can be reduced by putting my name in quotes, but what happens when we have to search references which simply cite "E. Garfield"? This search proved to be almost useless unless you are interested in Garfield the cat! (Slide 18: Index of Persons - Cantrell)[10]

Once again, let me stress the importance of display or visualization. With Alta Vista and other crawlers, you must hyperlink to each URL in turn to find out why you were directed to that URL.

In a typical citation search using an *SCI* CD-ROM, here is what you see initially for a cited reference search. Note that I do not have to specify the full first name but simply the initials, which is standard practice in science journals. (Slide 19: *SCI* Search on Eugene Garfield from 96 Jan-May Disc; Slide 20: *SCI* Search Results (List of Citing Papers))[10]

These could have included abstracts. Whether article titles or abstracts, these are printed as a group or one at a time.

In the next slide (Slide 21: Sample Long Citing Record)[10] I've printed one full citing record, which includes title, authors, addresses, abstract, and list of cited references.

In the near future you will be able to do these SCI searches via the ISI Intranet. And it will also be possible via the ISI Electronic Library to access the electronic version of journals. That project has been widely announced and briefly described as providing "users with immediate desktop access to the tables-of-contents, bibliographic data, and abstracts of the approximately 1,350 prestigious journals indexed in *Current Contents/Life Sci-*

ences, as well as to the full images of those journals in the system for which publishers have given permission. ISI has partnered with a number of players like IBM in order to expedite this initiative.

Visualization

Visualization has become a hot new area of information science thanks to people like Ed Tufte[6] and Jock Mackinlay, Ramana Rao, and Stuart Card at Xerox Research Center in Palo Alto[7]. (Slide 22)[10]

In this slide you can see how citation networks are visualized in their butterfly model of the citing and cited pathways to a key paper. Unfortunately, I can't fully demonstrate how this three dimensional portrayal works. It moves around in 3-D like you move molecular models.

For decades information scientists and historians like Derek Price have aspired to use the *Science Citation Index* database to create an *Atlas of Science*. Henry G. Small visualized a future version of a Citation Index that would also include the ability to do citation context analysis.[8] In this particular version of the SCI, the display of citing papers would not be limited to citing titles and authors but would also include citing sentences or paragraphs. In addition, the information would be displayed in the form of "maps" that reveal intellectual connections. Thus, mini-reviews would be organized automatically but also supplemented with visual mappings of the interrelated links.

The *Atlas of Science* experiment was aborted but this work has been superseded by an electronic version called SciMap. Henry Small's research group provides "SciMap" software to create co-citation maps like those I presented recently at the International Conference on Prostaglandins and Related Compounds in Vienna. (Slide 23: SciMap Example)[10]

And eventually this software will be expanded to generate historiographs from the repertoire of research fronts ISI identifies each year. (Slide 24: Historiograph Example; Slide 25: Co-citation of Core Papers for "Prostaglandins and Inflammation" (RF 76-0869))[10]

In the near future, I have little doubt that searching will be easier, and index displays more friendly and hypersearching within Intranets, at least, will provide real time access.

Whether the Internet survives the next stage of its exponential growth has been seriously questioned. Therefore, the separation of the scientific and

scholarly portion of the URL universe from other public information it presently contains may be necessary for its technical survival. In 1963, John W. Senders estimated the escalating information content of the world's libraries.[9] He also discussed the exponential growth of the indexes needed to search these files. It will be interesting to see how long it takes for the Internet to reach exponential saturation unless huge investments are made worldwide to provide real time access to every user.

References and Annotation

1. OKERSON, Ann Shumelda and O'DONNELL, James, eds., *Scholarly Journals at the Crossroads: A Subversive Proposal for Electronic Publishing. An Internet Discussion about Scientific and Scholarly Journals and Their Future.* Washington, DC: Association of Research Libraries, 1995.

2. QUINN, Frank. A Role for Libraries in Electronic Publication. *Serials Review*, 21: 19 (June 21, 1991).

3. SUMMIT, Roger. The New Information Paradigm: Threat or Opportunity (Or Both)? *NFAIS Newsletter*, 38, (4/5), p. 57-69 (April/May 1996).

4. GARFIELD, Eugene. Introducing ASCA IV, An SDI System with Exclusive Features. *Current Contents*, May 2, 1969. Reprinted in: *Essays of an Information Scientist*, Volume 1, p. 38.

5. CARR, Leslie, DE ROURE, David, HALL, Wendy, and HILL, Gary. *The Distributed Link Service: A Tool for Publishers, Authors, and Readers. Proceedings of The Web Revolution: Fourth International World Wide Web Conference*, 1995.

6. TUFTE, Ed. *Envisioning Information*. Cheshire, CT: Graphic Press, 1990. 128 p.

7. MACKINLAY, Jock, RAO, Ramana, and CARD, Stuart. An Organic User Interface for Searching Citation Links. In: *Human Factors in Computing System Proceedings, Annual Conference Series, ACM SIGCHI*, 1995. p. 67-73.

8. SMALL, Henry G. Cited Documents as Concept Symbols. *Social Studies of Science*, 8, p. 327-340, 1978.

9.   SENDERS, John W. Information Storage Requirements for the Contents of the World's Libraries. *Science,* 141, p. 1067, 1963.

10.   The slides #13 to #25 are not reproducible. A copy of the entire speech (including all slides) can be directly requested from the author by sending an e-mail to garfield@isinet.com.

JSTOR: The Andrew W. Mellon Foundation's Journal Storage Project

Richard De Gennaro
JSTOR, New York, USA

Richard De Gennaro is the Senior Library Advisor and member of the Board of JSTOR, an independent not-for-profit organization established with the assistance of The Andrew W. Mellon Foundation to help the scholarly community take advantage of advances in information technologies. Dr. De Gennaro was the Roy E. Larsen Librarian of Harvard College from 1990 to 1996, Director of The New York Public Library from 1987 to 1990, and Director of Libraries and Adjunct Professor of English at the University of Pennsylvania from 1970 to 1986. He is an internationally recognized authority on library and information technology and library management and is the author of some fifty papers and has completed over sixty consulting assignments.

Abstract

JSTOR is a Mellon-funded collaborative project involving the University of Michigan, Princeton, Harvard, and some fifteen other test sites. Its purpose is to create faithful electronic replications of backfiles of core journals in the humanities and social sciences in order to preserve and increase access to the information contained in them. Using technology developed at Michigan, high-resolution (600 dpi) bit-mapped images of each page are linked to a text file generated with optical character recognition (OCR) software which, along with newly constructed Table-of-Contents indexes, allow for complete search and retrieval of the journal material. Some fifteen journals in the fields of

history, economics, finance, and ecology have been fully digitized
and are available on the Internet to the test sites. Plans call for
offering some 25 journals to subscribing libraries by January
1997 and a total of over 100 by the year 2000.

Foreword

In recent years there has been a good deal of discussion and speculation
about the feasibility and usefulness of digitizing large quantities of printed
books and journals in library stacks and making them available to users on
the Internet. There are some who believe that it would be a boon to
librarians and library users. There are others who think that retrospective
materials would be very limited and would not justify the high cost of
digitizing and maintaining them.

JSTOR is based on the belief that such a digital database of carefully
selected retrospective core research materials would be invaluable to
librarians and scholars; and that the conversion and maintenance costs are
feasible when shared among a large number of library subscribers. The
Andrew W. Mellon Foundation has made a substantial investment in
launching the JSTOR initiative and establishing JSTOR as a not-for-profit
organization dedicated to accomplishing this goal in collaboration with
publishers, librarians, and scholars.

Background and Evolution

Originally conceived by William G. Bowen, President of The Andrew W.
Mellon Foundation, JSTOR began as an effort to ease the increasing
problems faced by libraries seeking to provide adequate stack space for the
long runs of backfiles of scholarly journals. The basic idea was to convert
the back issues of paper journals into electronic formats that would allow
savings in space (and in capital costs associated with that space) while
simultaneously improving access to the journal content. It was also hoped
that the project might offer a solution to preservation problems associated
with storing paper volumes.

To demonstrate the concept, the Mellon Foundation sponsored a pilot
project to provide electronic access to the backfiles of ten journals in two
core fields, economics and history. Now complete, every issue of the ten

participating journals published prior to 1990 - approximately 750,000 total pages - has been converted from paper into an electronic database which now resides at the University of Michigan. Using technology developed at Michigan, high-resolution (600 dpi) bit-mapped images of each page are linked to a text file generated with optical character recognition (OCR) software which, along with newly constructed Table-of-Contents indexes, allow for complete search and retrieval of the journal material.

Initial users of JSTOR were enthusiastic, and it was evident very quickly that the idea held great promise. Linking a searchable text file to the page images of the entire published record of a journal offers a level of access previously unimaginable. Authorized users are able to view and print articles using standard PC equipment at any time and from any networked location. Issues of journals are never "out"; they are always available, and in pristine condition. In sum, the addition of powerful search and printing capabilities makes the JSTOR system more than just a way for libraries to save capital costs; it has become a scholarly tool of enormous value.

From inception, the Foundation did not intend to provide a perpetual subsidy to convert the journal literature; the project would have to be self-sustaining if it was to succeed. That commitment, along with the enthusiasm with which the project was being received, led the Foundation's trustees to establish an independent not-for-profit organization, called JSTOR, to oversee management of the project.

JSTOR's mission is to help the scholarly community take advantage of advances in information technologies. In pursuing this mission, JSTOR has adopted a system-wide perspective, taking into account the sometimes conflicting needs of libraries, publishers, and scholars. In addition to saving shelf space for libraries and increasing access for scholars, JSTOR also endeavors to assist publishers, who play an important role in the system by providing mechanisms for peer review and quality control.

Goals

As stated on the Andrew W. Mellon home page (http://www.mellon.org/jstor.html) the primary objectives of JSTOR are:

1. to improve dramatically access to journal literature for faculty, students, and other scholars by linking bit-mapped images of journal pages to a powerful search engine;

2. to mitigate some of the vexing economic problems of libraries by easing storage problems (thereby saving prospective capital costs involved in building more shelf space), and also by reducing operating costs associated with retrieving back issues and reshelving them;

3. to address issues of conservation and preservation such as broken runs, mutilated pages, and long-term deterioration of paper copy; and

4. to assist scholarly associations and other publishers in making the transition to electronic modes of publication while protecting their traditional values and financial stability.

How it works

After concluding the negotiation of a copyright licensing agreement between JSTOR and a journal publisher, print copies of the complete run of the journal are located, subjected to page-by-page analysis for missing or damaged pages, and sent to a scanning bureau with specific indexing instructions prepared by a serials specialist. Once at the scanner, the basic electronic file is produced by scanning in pages. The scanning bureau also produces an ASCII text version of the journals using OCR software, which is subjected to a two-stage process of error correction to produce a text file that is 99.95 percent accurate. This text file is what makes it possible for a user to search on words or phrases wherever the words appear in a title, in a text, or in a bibliographic reference - and then view on screen and print the page images of articles which contain this phrase.

Pilot Phase

Five library sites were originally chosen to test and help improve the JSTOR system - Bryn Mawr College, Dennison University, Haverford College, Swarthmore College, and Williams College. As the Project evolved, the University of Michigan and Harvard University were added as test sites.

New Test Sites

JSTOR has recently added a second group of 10 sites to the original sites from 1994/95. These new sites are:

- Cornell University
- University of Chicago
- Emory University
- University of Delaware

- Princeton University
- University of Texas at Austin
- Stanford University
- University of Wisconsin
- University of California, Berkeley
- Yale University

Distribution Plan

JSTOR continues to negotiate with publishers in an effort to offer improved access to the backfiles of an increasing number of core scholarly journals. The decision to publish electronically is a difficult and complicated one and JSTOR approaches publishers in a spirit of partnership. For example, in order to safeguard publishers' current issue subscription revenues, yet still guarantee to libraries that the archive is being taken care of, JSTOR has created the concept of a moving wall, which establishes a constant period of time which the JSTOR archive would lag current issues (e.g. 3 years). Also, because JSTOR is a not-for-profit organization, it has agreed to establish a pool of funds to be divided among publishers to help defray editorial expenses once it has achieved a breakeven level of operations. Publishers from several fields other than history and economics have already signed JSTOR licensing agreements, including important titles in political science, population and demography, mathematics, and others. JSTOR is in the process of compiling clusters of journals in major fields of study, making it possible for scholars not only to search on important journals in a particular field, but also to search across titles from a variety of related disciplines.

JSTOR Pricing and Availability

JSTOR will contain the complete runs of a minimum of 100 important titles in 10-15 fields within 3 years. We are calling this collection JSTOR-Phase I.

All academic institutions will be offered site licenses permitting access to the archive on campus networks. These licenses will vary in cost based on the size of the participating library/institution.

There will be two types of payment:

1) One-time Database Development Fee, for permanent access rights to information in the Phase I archive;

2) Annual Access Fee, to help cover the recurring costs of updating and maintaining the archive.

The database service will be launched officially on January 1, 1997 with an initial offering of 25 journals in 5 fields.

Prices

The Database Development Fee for Large Libraries will be $40,000; for Medium Libraries $30,000; and for Small Libraries $20,000. Under consideration is a fourth category of Very Small Libraries. The Annual Access Fee will be $5,000 for Large Libraries, $4,000 for Medium Libraries, and $3,000 for Small Libraries.

As an incentive for institutions to make early commitments to participate in JSTOR, we will be offering Charter Libraries a 25% discount off the standard fees.

Conclusion

Since JSTOR is a new entity in a dynamic environment, there are many unknowns. We are working hard to continue to build on the improvements and refinements that were made with the aid of the original pilot sites during the first year of the project, and we will no doubt continue to learn and evolve. We appreciate your feedback and look forward to working with you to help the scholarly community gain better access to archival journal literature.

Appendix

Participating Journals
(Listed by field - as of October 1996)

Economics:
American Economic Review
Journal of Economic Perspectives
Journal of Economic Literature
Econometrica
Journal of Political Economy
Quarterly Journal of Economics
Review of Economics and Statistics

Finance:
Journal of Money, Credit, and Banking

Mathematics:
Annals of Mathematics
SIAM Review
SIAM Journal on Applied Mathematics
SIAM Journal on Numerical Analysis
Journal of the American Mathematical Society
Proceedings of the American Mathematical Society
Mathematics of Computation
Transactions of the American Mathematical Society

Population/Demography:
Population Index
Population and Development Review
Studies in Family Planning
Demography
Family Planning Perspectives
International Family Planning Perspectives

Political Science:
American Political Science Review

History:
American Historical Review
Journal of American History
Journal of Modern History
William and Mary Quarterly
Speculum
Renaissance Quarterly
The Journal of Military History

Sociology:
Annual Review of Sociology
American Sociological Review
Contemporary Sociology
Sociology of Education
Social Psychology Quarterly
Health and Social Behavior

Ecology:
Ecological Monographs
Annual Review of Ecology and Systematics

Higher Education
Journal of Higher Education:

Asian Studies:
Journal of Asian Studies

LAIRD and the Curriculum plus a short note on The Future of National Libraries in Britain

Bernard Gallivan
National Library of Scotland, Edinburgh, United Kingdom

Bernard Gallivan is presently Director of the Department of Electronic Information in the National Library of Scotland (NLS). Previously he was Director of Computer Services and Research in the NLS and before that Director of the SCOLCAP project. A Chartered Engineer and a long time member of the British Computer Society, he began by designing and making computers about forty years ago. This was followed by various library-based projects including the design of the first hybrid issue system for libraries and the design of unique data collection devices. Unusually for a computer engineer, he is also a fully qualified librarian and has been able to bring these two quite different skills into effective play on many occasions during his thirty years working in libraries.

Abstract

The proposed national libraries and archives database relating to Scottish material is presented together with estimates of the cost, timescale and the dimensions of the project. The way the database will relate to the curriculum is described.

In addition, looking to the year 2000, a new proposal is made to enable national libraries in the UK once more to provide the full range of services supplied a few years ago but which budgetary cutbacks have severely reduced in recent years, together with a wide range of new services made possible by the advent of electronic information and the Internet. These later services will follow on from the new proposal which will permit a massive programme of digitisation to take place and all without any additional cost to the UK taxpayer.

LAIRD - Libraries and Archives Integrated Resources Database

Many of you will be aware that the UK National Lottery began just under two years ago. It is unique among European lotteries in being privately run rather than state run. It has also shown what a nation of gamblers we British are. Billions of pounds have been spent by people hoping to become instant millionaires. Twenty eight percent of all the money gambled on the lottery is allocated to the arts, sport and charities. It is distributed by bodies such as the Millennium Lottery Fund and The Heritage Lottery Fund. Committees of the great and the good receive applications for money to support the building of a football stadium or an opera house or to install lights to illuminate a church, and so on. Hundreds of millions of pounds has already been disbursed on such projects. The money is supposed to be **in addition to** the money normally allocated for such projects but many of us are beginning to suspect that it is allocated **in place of** the usual departmental money. An interesting statistic to bear in mind is that among the many hundreds of projects to benefit from lottery money, so far 55 awards amounting to £73 million have been made to museums in Britain. There have been no significant awards to libraries in Britain up to the time of writing this paper.

The purpose of LAIRD is to create an electronic database of documents relating to Scottish culture and heritage and to be a source for local history across Scotland. Three types of information, all of which will be contributed by the participating libraries and archives, have been identified.

The first type of information will comprise the best and most interesting ten or so items relating to Scottish culture and heritage, local or national, held in each library and archive in Scotland. Local librarians and archivists will be allowed to select these contributions. Contributed holdings might comprise a collection of photographs, maps, or postcards. They might be charters, letters or books but each will be chosen for the unique contribution it makes to Scottish history. Quite rightly, these items will be held in high regard by their curators who probably would be reluctant to pop them into an envelope to send to the scanning bureau. To provide maximum protection for these rare items and to allow local curators to supervise this work, a whole series of different techniques will be used to digitise these documents. We will use normal photography to create slides which will later be scanned, digital photography for direct capture, and scanning using flat-bed scanners as appropriate. In certain instances, a mobile scanning bureau will be taken to the owning library or archive.

The second type of information will relate to those items identified jointly by the LAIRD Database Content Committee working with those setting the Scottish schools curricula. Careful pre-planning will be required for this information. The locations of these items will have to be identified and mechanisms worked out for them to be scanned. A specially trained member of LAIRD staff will be on hand to resolve copyright issues but the very old material with which LAIRD will work, should minimise copyright problems.

The third type of information will relate to specific themes identified by the LAIRD Database Content Committee, this time working alone. They will identify anniversaries of great events and people of importance to the Scottish nation well enough in advance to allow the accumulation of appropriate information on those subjects by the time of the anniversary or event. They will also identify more general themes such as the effects of the industrial revolution on Scotland, the Highland Clearances, etc. There will also be an interest in the preservation of information on traditional Scottish skills and crafts. The idea is to enable all libraries and archives, large and small, public and special, near or far, to participate in the creation of the LAIRD database and to give them a feeling of ownership in the project.

All the above information will be catalogued and indexed to agreed standards to facilitate easy access. In addition, through a series of notes, each contribution could be enhanced by third parties who can contribute other important and relevant information about the different contributions. All LAIRD information will be freely available over the WWW. In addition, a series of CDs will be created on various of the special themes pursued during the period of the project.

In the first five year period we hope to load 500,000 graphical images and 1 million pages of text to support and qualify the graphical images.

LAIRD is a project costing almost £20 million, funds for which will be sought from the UK Heritage Lottery Fund. A consultant has already been appointed to investigate the level of interest in a LAIRD-like project and his report presented earlier this year shows overwhelming interest and support for the idea.[1]

The present timescale for the project expects an application for funds to be submitted in the next six months and if successful work will begin by October 1997. About 50% funding will be requested from the Heritage Lottery Fund with the libraries and archives contributing in kind the other

277

50%. The libraries and archives will not, of course, be required to divert any of their scarce cash to LAIRD. Their contributions will be in some equipment costs and in the material they offer for scanning into the LAIRD database. They will be paid for any extra effort or cost this will cause them and in addition they will gain the electronic versions of those items they contribute which they will be allowed to exploit commercially. LAIRD will reserve the right to exploit the material educationally.

The LAIRD database will eventually represent a close approximation to a very large electronic library providing information in specific subject areas. There is no reason why the range of these subject areas should not expand in the fullness of time.

National Libraries in the UK - Some Thoughts

For at least the past seven or so years an insidious danger has threatened the very existence of the present system of national libraries in Britain. This same danger is also threatening the existence of many other libraries, including university libraries, throughout the rest of the world[2]. This first danger arrived with the birth of electronic alternatives to the printed word and in recent years has been compounded by the arrival of two other yet more insidious dangers. The first is the World Wide Web, which affects all libraries throughout the world and the second is the lack of funds available to the UK's national libraries to allow them to do their jobs at a reasonable level. The proposed LAIRD project described above is a manifestation of just such a danger to national libraries in the UK particularly when such stand-alone ventures can be funded but similar ventures by and within our national libraries cannot. In a paper presented to the Essen Symposium in 1991[3], this author warned of the dangers to an organisation such as the National Library of Scotland (NLS) should it fail to recognize the warning signs and not make attempts to address them. For a variety of reasons, most of which have been outwith the control of the NLS, that nettle was not grasped in time. Predictions made five years ago are now the realities with which we must live. The situation is now so serious that while some drastic measures have already been taken, yet more drastic measures are called for.

The United Kingdom is unusual, if not unique in the world, in maintaining five copyright deposit libraries within its boundaries. Three of these copyright libraries are national libraries: The British Library (BL), the

National Library of Scotland (NLS) and the National Library of Wales (NLW), and two are university libraries (Oxford and Cambridge). This paper directs itself solely to the three national libraries and the views expressed are solely those of the author. They are not yet the policy of any of the national libraries, as far as is known.

Funding for the UK's national libraries is provided via Central Government and is derived from taxes. It is the policy of the present government to reduce taxes. Therefore, all central services which rely on taxes for their funding are under attack. In the past five years or so, the annual budgets to all three national libraries have been severely squeezed and in the last two years their budgets have failed miserably to keep pace with inflation. Money available to pay for staff has been particularly badly affected. For example, in the NLS, out of a staff complement of about 270, at a time when the demands on the library are greater than ever, it has already been forced to shed 30 posts and a further 30 posts will have to be shed in the next five years if it is to stay within expected budgets. The Government has frozen the NLS's staff budget to last year's level which will have to be carried into an indeterminate number of future years but, in the meantime, the NLS has to pay agreed wage increases as well as performance pay increases. The only way to do this is to shed some staff to help pay those staff still in post. As with the other national libraries, the NLS is not allowed to transfer other operating money into the staff element of its budget. (As an aside, members of parliament recently voted themselves a 26% pay increase but, of course, not at the expense of fewer politicians, or other measures of greater performance.)

Budget reductions are now cutting into the range and quality of the services the NLS can provide and identical stories can be told by the other national libraries in the UK. There are no signs that this policy will end and even a new Socialist administration is unlikely to reverse the trend, particularly if it entails increasing taxes, at least in the lifetime of that administration's first term - the next five years.

All three national libraries in the UK are underfunded compared with a few years ago and particularly so when one considers the increased demand for established services from those three libraries as well as the growing demands for new services.

What of the three national libraries. The BL is based in London, primarily, and has another important base in Boston Spa, Yorkshire. The NLS is

279

based in Edinburgh and the NLW is based in Aberystwyth, on the west coast of Wales. If you want to consult an item in any of these libraries you must travel to the appropriate library. London is reasonably easy to get to from within and outwith the UK though travel is costly in terms of time and money. The NLS is also reasonably accessible though many Scottish scholars, not based in or near Edinburgh prefer to go directly to London to consult the greater resources of the BL. The location of the NLW was decided by politics and not by considerations of accessibility. It is really only readily accessible to those living in Aberystwyth. It should have been based in Cardiff, the Welsh capital, but Cardiff is not a Welsh speaking city. If you want a location as pollution free as possible, in today's terms, and where few scholars will ever go to cause damage to the books, Aberystwyth takes some beating!

Because all three libraries are copyright deposit libraries, a large part of the annual accessions of each of the libraries is identical. About 700,000 items are added to the collections of the NLS and the NLW at the same time as those identical items are also added to the collections of the BL. These items all have to be added to the catalogues of all three libraries. So similar are their copyright receipt accessions, the three national libraries all share the same copyright agent who claims from publishers on their behalf. Already, because of the financial pressures indicated above, the NLS cannot catalogue all this copyright material to its traditional standards. These higher standards are now reserved for Scottish publications or material with Scottish content or interest.

All this material has to be stored in special, high quality buildings capable of preserving the nations published heritage. It has been claimed that the BL adds ten miles of new shelving each year to house new accessions. The figures for the NLS and the NLW are 3 miles and 2 miles respectively. The new buildings and new annexes needed to house these ever growing collections, on average over a 30 year cycle, cost the taxpayer about £19 million per annum. The money tends to be spent in large chunks on projects such as the soon-to-be-opened £500 million pound new BL building and the even more recent £60 million made available for NLS new buildings and upgrades to existing buildings, but the new buildings figure averages out at £19 million p.a.

More material also implies more van service costs as more books are shipped between buildings, more preservation costs, more bookfetcher

costs, and more of just about everything, including the money to run the service.

A simple calculation shows that the British taxpayer spends about £129 million each year on his national libraries. That is £2.50 for every man, woman and child in Britain. This figure includes the annual budgets of the three national libraries plus the comparatively small annual contribution to the cost of providing new buildings and extension every twenty years or so. Since there are about 35,000 registered users of the 1,500 reader places in the reading rooms of our three national libraries, each reader place costs the taxpayer £86,000 each year and allowing two occupations of each seat on every day the libraries are open (a generous allocation) each visit costs the taxpayer £170 per visit. Significant as this £129 million p.a. sum is, on the present evidence, it is substantially inadequate when it has to fund three large national libraries.

Unless this problem is tackled soon, each of Britain's national libraries will be faced with yet more reductions in budgets, staff and services. The situation predicted five years ago for the NLS has already extended to include all three national libraries. All presently have been and will continue to be forced to shed valuable services and to specialise more in order just to survive. National library provision in Britain will decline and decay and the opportunity to transform the service will be lost.

The above very gloomy picture is a true picture of the system as it presently exists but fortunately there is a better way to provide a newer, better and more comprehensive range of national library services for all the people in the UK without it costing the taxpayer a penny more than is currently being spent.

What will be described next has some striking resemblances to the Canadian libraries system described by Margaret Beckman yesterday. There are also some interesting parallels in the space/storage implications of what will be described to the system just described by Dick De Gennaro.

What is proposed is the creation of a new National Library of Britain (NLB). This new NLB will provide the traditional, full range of identical services to all users in England, Scotland and Wales. In addition, new services based on the availability of electronic information and the Internet will be made available. Citizens of Northern Ireland will still have to travel to the nearest or most conveniently placed of the three NLB locations where they will receive a much improved service than is currently available. To achieve the

above benefits the present BL, NLS and NLW organisations must be coordinated into a single, distributed NLB. The online catalogues of all three organisations must be made available to readers in all three locations - London, Edinburgh and Aberystwyth - and readers will be allowed to consult most items available in any part of the NLB system in their nearest NLB reading room. Certain special items will still require the reader to travel to them regardless of whether those items are in the BL, the NLS or the NLW but for the first time in the UK, and immediately the system is put into operation, a far wider selection of material will be available to readers in all three national library locations than has hitherto been available.

In the short term, a van service will operate between London and the other two locations to service the three main reading rooms of the distributed NLB. Except for the addition of appropriate material, to be defined next, the collections of the NLS and the NLW will largely be frozen. In the case of the NLS, it will cease collecting all British copyright material and foreign material and will limit its collecting to Scottish material. Similarly, the NLW will limit its collecting to Welsh material. Initially, no material will be de-accessioned from the two smaller libraries and the van service will fill in those gaps left by the much reduced copyright collecting of the smaller libraries as well as for the supply of items now generally available for the first time to the other libraries. With a little forward planning by the user, he or she need not be inconvenienced even when only this interim system is in operation. By providing access to a much larger range of material, even in this first stage of development of the new system, an overall better national library service to UK users will result.

The van service will be owned by the NLB. This will be more expensive to operate than chartering a service from a commercial company but with such valuable items travelling up and down the country, it is probably better to use a wholly owned service. Such a service will cost no more than £400,000 per annum, and will represent a very small proportion of the savings achieved by the rationalisations suggested above.

More of the savings achieved will be spent strengthening the London base of the NLB which will experience new demands on its collections but even so, many millions of pounds will be left to pay for an ongoing programme of digitisation. Initially, this will allow the conversion of all new copyright material to digital form **for viewing exclusively in the three locations of the**

new, distributed NLB. The most recent copyright deposit material will be digitised first followed by older copyright deposit material. As this older copyright material becomes available for viewing in all three national libraries, the printed book versions of those digitised works in Edinburgh and Aberystwyth will be discarded to make room for the growing single collection of the NLB. A single copy of the printed versions of each book will always be retained somewhere in the NLB but no additional buildings for the NLB will be required for at least the next 100 years, and probably never again. Yesterday, Frank Oliver, in his paper, asked "Who will pay for the digitisation of the National Bibliography?" This note provides an answer to that question, at least as it applies to the UK. In addition, the method proposed will achieve that aim without any additional cost to the taxpayer.

Under this new scheme, at least initially, no additional consultation opportunities to view copyright material will be given to readers than they already enjoy, so British publishers will not be able to claim any loss following the introduction of the scheme. Publishers must not be allowed to stand in the way of this development and, if necessary, special legislation might be required to allow the scheme to be introduced without hindrance. On the other hand, when a reasonable payment system has been agreed with publishers for the use of electronic surrogates of their publications, the new NLB will have a unique opportunity to distribute its electronic information far and wide.

For political reasons, a NLB might not be acceptable to Scotland or Wales, or even to England. However, if the British Government is unwilling to provide taxpayers money to enable all three nations to operate efficient national library systems or if those nations themselves are unwilling or are unable to fund their own national library systems at a significantly higher level than is presently the case, **the same fate of reduced copyright deposit collecting and no further foreign material collecting awaits them** but without the backup of the NLB and electronic information.

The above system could be introduced rather more subtly by retaining the names of the three existing national libraries and allowing each library to retain a degree of autonomy. While still workable, the disadvantage of this approach is that it does not maximise the benefits, both in cost savings and in management control, available to a UK-wide system under the direction of a single management team.

Conclusion

Money to improve library services is available in Britain through the National Lottery Fund. Even very significant initiatives can attract large sums of lottery money but, unfortunately, no money, the equivalent of the Follett money available to British university libraries, is available to our national libraries to offset the lack of funds from central government to support their ongoing activities. Instead, national libraries in Britain are suffering damaging cutbacks. This short note identifies a means of allowing a full and, indeed, an improved range of services once more to be offered from all three national library locations and at the same time it offers a way to digitise large amounts of British material all at no extra cost to the British taxpayer. The way forward is in the creation of a distributed National Library of Britain.

On the other hand, **if we do nothing we must resign ourselves to working in previously proud organisations which will be doomed to decline and decay. If we grasp this challenge we can create a new, dynamic National Library of Britain which will be able to respond to the information needs of British citizens in the next millennium.**

References

1.   OSBORNE, Brian D. Libraries and Archives Integrated Resources Database - A report to the National Library of Scotland and the Scottish Library and Information Council. June 1996.

2.   NOAM, Eli M. Electronics and the Dim Future of the University. *ASIS Bulletin*, 22, (5), pp. 6-9, June/July 1996.

3.   GALLIVAN, Bernard. Full Text Imperatives for the National Library of Scotland. In: *Libraries and Electronic Publishing: promises and challenges for the 90's; Festschrift in honour of Richard Dougherty/ Proceedings of the 14th International Essen Symposium, 14-17 Oct. 1991*, edited by Ahmed H. Helal and Joachim W. Weiss, Essen, University Library Essen, 1992, pp. 97-114.

Internet Search Engines: Are Users Ready?

Andrew G. Torok
Northern Illinois University, DeKalb, Illinois, USA

Andrew G. Torok has a B.S. in Chemistry from the University of Vermont, an M.S. in Chemistry from Cleveland State University, and an M.S. and Ph.D. in Library and Information Science from Case-Western Reserve University. He has worked in school, public, special, and academic libraries, as well as served as an abstractor for Chemical Abstracts Service. He taught in the Department of Library and Information Studies at Northern Illinois University from 1973 until 1993, and is currently an associate professor of Instructional Technology at Northern Illinois University.

Abstract

The Internet has created a paradigm shift where end users are rapidly replacing trained professionals for online access to information. Software search engines facilitating end user access to information offer sophisticated retrieval options such as Boolean searching, term weighting, and relevancy ranking of output. The major problem with search engines is that no two engines retrieve the same information, nor are the results likely to be relevant to the query. Other problems affecting retrieval are Web page content and variables associated with how users search. A general lack of standards makes search engine design difficult. This paper examines search engine capabilities, including the newest category of search engines, termed "intelligent agents", and behavioral issues influencing user behavior. The impact of end user searching on libraries is outlined, with suggestions for future directions.

Introduction

The preface to the 1994 Essen Symposium Proceedings stated that "Paradoxically, while access to information has been technologically facilitated through the Internet, the process of locating desired information has become more complex for the user."[1] As a result of major improvements in user-friendly, intuitive search engines and standards development, information access has become easier in the past two years. It appears that these search engines and the World Wide Web (WWW) fulfill the theories underlying Mortimer Taube's Uniterm Indexing and Vannevar Bush's Memex. This paper takes a critical look at Internet search engines and the promises and pitfalls they hold for end user searching.

Vast information resources are now available in a globally accessible library that defies imagination. Web sites have doubled every year for the last three years. There are over 30 million Web sites and approximately 326,000 domains registered with Internic.[2] Although the Internet as a whole, and the WWW in particular, represents a single-digit fraction of all the recorded knowledge in the world, it is becoming the virtual library of choice. Use of library collections based on "just-in-case" strategies continue to lose ground to the "just-in-time" availability of Internet resources. The mixed quality of unedited and constantly changing unrefereed information provided on Web sites does little to dampen the enthusiasm of end users. For example, PointCast, a Web search engine company, says it will top a million users by year-end. PointCast claims 26 million hits a day, an activity second only to Netscape Communications Corp.[3]

Browsers and Search Engines

User access to the Internet virtual library is through software programs referred to as browsers. The two most popular Internet browsers are Netscape Navigator, with approximately 84% of the market share, and Microsoft Explorer, with about 10% of the market. Browsers in turn allow the user to select one or more search programs, generically called search engines (SE), which have paid a handsome sum to be available to users. The following search engines (Excite, Yahoo, Infoseek, Lycos, and Magellan) pay Netscape a total of 25 million dollars a year for the privilege.

Search engines maintain indexed databases of all or portions of the Internet sites, using software search agents referred to as Web crawlers, robots,

spiders, Web wanderers, or worms.[4] These fall into the general classification of Internet Broadcast Technology. There are well over 150 search agents on the market and many of them are free. As a result of different performance objectives, subject orientation, or poor design, significant differences exist between search engines. Some engines search only Web documents, and others include Gopher sites, usenet groups, and other resources. Subject-specific search engines seek out only certain types of sites, or restrict the searches to popular Web sites. Some engines index only the Uniform Resource Locator (URL) and the first page, while others index every single word in a document. The method of indexing may also vary, with some SE being limited to keyword indexing, and others include concept indexing. Some engines do not index binary files or graphic formats. Not all search engines index meta tags. Meta tags consist of Web page concept words not seen by the users, but which can also be used to improve relevance.[5] The end user is often kept in the dark about a search engine's coverage, its capabilities, or how a search is actually submitted to the Internet. Perhaps the single greatest design problem with search engines is their attempt to oversimplify the search process. Most engines prompt the user for key words without directions indicating how the words will be searched. For example, a search for the acronym COLD, which stands for Computer Output to Laser Disc, produced 473,200 results because the search engine that was used had a poorly designed case-sensitive search feature. In examining the first 200 hits, none were relevant.

The ideal engine should be able to take a natural language phrase and find the most relevant information without expecting users to master Boolean or other structured logic. In practice, the quantity, precision and recall of search results are affected by a number of SE variables. These are:

1. Ease of use and help features;

2. Characteristics of the query language (syntax, special features...);

3. The portion of an Internet document actually indexed;

4. What Internet sites are visited and indexed, and how often they are re-visited;

5. How the indexing is performed (keyword or concept), and

6. Output format options (abstract, relevancy ranking, duplication re-moval...)

287

Good search engines offer some really interesting features, although beginning users that discover them are often intimidated. Some of the major features of SE are shown in the following list:

Search Engine Features

- Relevancy Ranking
- Field Searching
- Automatic Phrase Recognition
- Word Weighting
- Concept Recognition
- Boolean Logic
- Proximity Searching
- Support for European Character Set
- Case Sensitivity
- Find Word Variants
- Natural Language Queries
- Exact Link Count
- Selective Document Capture
- Recognize Altered Documents
- Stop/Go Word Support
- Customized Output
- Automatic Proper Name Recognition
- Number Recognition

Experiments comparing the performance of search engines are being conducted constantly. The rankings fluctuate with each new version of a search engine and according to who does the study. The following list compares test results performed three months apart by the same company.[6]

General Interest Web Search Engines: Rating (06/11/96)

Biggest, Fastest, Coolest: Alta Vista
   Runners-up: Webcrawler (fast and cool), Lycos (big)

Most Comprehensive Results: Lycos
   Runner-up: Infoseek

Highest Overall Usability: Infoseek
   Runners-up: Excite, Open Text

Most Relevant Results: Excite
Runners-up: Infoseek, Webcrawler

Most Likely to Find a Hit When Others Can't: Alta Vista
Runner-up: Infoseek

General Interest Web Search Engines: Tested (09/10/96)

Biggest, Fastest, Coolest: Alta Vista
Runner-up: HotBot

Most Comprehensive Results: Infoseek
Runner-up: Lycos

Highest Overall usability: Infoseek
Runners-up: Excite, HotBot

Most Relevant Results: Infoseek
Runners-up: Excite, Webcrawler

Most Likely to Find a Hit When Others Can't: Alta Vista
Runners-up: HotBot, Infoseek

We see that Webcrawler lost a little ground, as did Excite and Lycos. One reason for the changes in ranking was the recent release of Infoseek's new version called "Infoseek Ultra". In these experiments speed was seldom an issue, with most engines returning results in a few seconds. However, when using the same terms, no two search engines yield the same results. For that matter none of the search engines offer a perfect balance of relevance and comprehensives. The main conclusion resulting from these tests is that all these engines have a long way to go before they could be relied on to deliver consistently accurate search findings.

One way to overcome the limitations of a single SE is to conduct parallel searches using search engine unifiers called Meta-Search Engines. These SE submit the query to several search engines. For example, "WebSeeker" uses twenty leading search engines which search simultaneously. The program eliminates duplicate results, monitors previous results for updated information, and schedules unattended searching as frequently as desired.[7] Using a Meta-Search Engine will certainly get users more results!

In the event you do not subscribe to the theory that more is better, some large Web sites have local search engines which can more specifically reflect the nature of the information. Two major search engines, Yahoo and

Excite, have created localized versions of their Web search engines, and numerous other ones are available for free or at a nominal cost.

Intelligent Agents

Until recently, the fundamental problem with search engine technology had been that they had not yet reached the point where humans and computers understand each other well enough to communicate clearly. However, the latest generation of search engines may well change that. SE are now available that use intelligent agents referred to as knowbots, super spiders, wizards, or network miners which monitor network servers, for information defined by a user profile. The terms "knowbot" and "agent" were first theorized in the early days of artificial intelligence. Today they are a practical reality. They can be best thought of as a piece of software to which a person can delegate some degree of responsibility. The agent software applies theories from cognitive psychology and education to reflect individual user behavior. Through iterative searching, these "smart" programs learn to cope with the vagaries of the Web. The quality of search results can be enhanced by subsequent refinements in the search profile. The agent software does not return to poor sites, and only new sites and updates on previously visited sites are searched. While initial searches may present low precision, the agents have the ability to modify search behavior based on the performance of earlier searches. The better agent programs also offer diagnostic online help and toll-free telephone assistance. To reflect the enhanced features of these programs, the newest preferred term is "filter" rather than "agent". The idea is to get away from the browsing metaphor which implies a highly time-consuming, labor-intensive, and expertise-requiring activity.[8]

Three main categories of intelligent agent applications can be described:

1. The first is termed "watching." An agent on some server browses periodically, waiting for some magical moment to arrive, like a book being published, the stock market doing something, an announcement of your favorite author presenting a seminar, a professional meeting being scheduled in some exotic place, or a news story. The agent then takes some action, like buying stock, or booking reservations for an event.

2. Information retrieval is simply monitoring the Internet using an agent fine tuned for a specialized area of knowledge, looking in only the right places, and downloading the information.

3. Orchestration is pulling together disparate information and building an organized database. Some search agents drop the results into existing software, such as Microsoft office Access, for subsequent manipulation. Filed tags can be added for enhanced local searching.

It is too early to tell what the impact agent software will have on anything. It is a well-known phenomenon that effective use of information technology lags well behind the invention of the new technology itself. As it is, producers of the technology are still trying to figure out the best way to sell it. First-time and occasional users will probably still have difficulty expressing information needs and formulating queries. Users with recurring information needs will most likely benefit from agent software. In all likelihood, a small number of users will account for the majority of Internet traffic as their agents automatically sally forth at frequent intervals. Current estimates are that in five years or less, half the traffic on the Web will be agent based.

There is, however, a problem with end users blissfully browsing through millions of databases and documents on intranets and the World Wide Web. Automated use of the Web is starting to challenge performance and push up system costs.[9] The average user spends 12 to 16 hours online each month. Use of automated software agents and increased multimedia content is likely to increase bandwidth usage. Early studies of agent software use indicate that some users send agents on hourly forays using every option at their disposal. Network resources are already inadequate to handle the traffic, with some notable breakdowns in major Internet backbone connections. Increasing bandwidth to accommodate growing search traffic is not the best cost-effective or cost-beneficial solution. The dilemma is that while organizations realize that information enhances productivity, the rising associated costs of searching and retrieval must be contained. In searching for information, more is not necessarily better.

One solution being enacted in corporations is to monitor and control transmission at the corporate firewall. Filters similar to software programs for regulating access to pornographic materials are being implemented. In universities, this approach might be met with some skepticism and might be considered an infringement on academic freedom. Nevertheless, all institutions need to assess the cost of end user searching. Another proposed solution is to teach users about the cost consequences of their actions and encourage them to voluntarily regulate information retrieval.[10] More practical solutions might be mandatory training of employees and students,

or the routing of search requests to the library for streamlining queries or minimizing duplicate effort. The library would be a perfect training site in educational institutions, and library schools could train trainers for the business world. The current bandwidth crisis is a good opportunity for librarians to team with network administrators for developing cost-effective solutions.

Web Site Design Issues

Search engine performance is really only part of the problem in information retrieval. Content and format of Web sites play an important part. "The fact that anyone can publish on the World Wide Web is both a blessing and a problem." [11] In many cases there is practically no editing or quality control. In addition, with the decentralized nature of the Internet, vocabulary control is practically non-existent. Even good Web pages can perform poorly because page designers fail to understand how search engines index and summarize pages.

An example of poor performance is to have a Web site not retrieved or ranked low in the relevancy ranking of search output, even though the information may be relevant. Conversely, Web sites may receive high ranking although they are not relevant. Relevancy ranking is generally determined by the number of words in the query that are in a web document, and the frequency with which they occur. The number of "hits" on a Web site can justify its existence and for commercial sites, garner advertising. Thus, Web site developers want to achieve a high relevancy ranking so that users are more likely to visit the site. In an effort to increase the number of "hits" on their site, Web page designers have taken to overloading meta tags with the same key word. Meta tags are added index terms which are not seen by the user. This practice of data manipulation is know as "spamdexing." [12] Sometimes the index terms have nothing to do with the subject content, as purveyors of pornography and other question-able content attempt to lure customers. Other malpractice which impact search performance abound. For example, Web sites can also purchase priority ranking. One search engine "Open Text" offers a preferred list option, where for $2,000 a Web site will always rank high on certain search terms. America Online's search engine (AOL) is rumored to give preference to its own sites over others.

Web page designers and search engine builders often try to outguess each other. Spiders which are tricked into viewing a Web site which engages in

"spamdexing" remember not to go back when re-indexing the WWW. For example, Lycos, a popular search engine, will not return to a Web site when a meta tag contains a term repeated more than seven times.

Standards

The standardization of search engine features and Web site formats may contribute to better performance. One of the major organizations involved in developing standards for the Web is the World Wide Web Consortium, referred to as the W3C.[13] The Web consortium was founded two years ago by Tim Berners-Lee, the inventor of HTML, and Albert Vezza, from the Massachusetts Institute of Technology Computer Lab. The W3C consists of 140 members that pay as much as $50,000 in annual dues for the opportunity to influence or get an early peek at technical specifications that will define tomorrow's Internet and corporate intranets. When a new or updated consortium specification is complete, members get details a month before the general public. Among the most active members are the industry's leading network and software suppliers, including Microsoft, Netscape, IBM, DEC, Hewlett-Packard, Adobe, Spyglass and AT&T.

The Internet Engineering Task Force (IETF) and the World Wide Web Consortium are developing an interoperability specification called the Simple Agent Transfer Protocol (SATP). This standard would enable developers to build agent-based client and server applications that work together regardless of the operating system or agent technology on which they are based.

The W3C is also looking at a number of other standards, such as a Platform For Internet Content Selection called PICS. PICS is developing specifications for user access to Web content through a rating system. PICS has received a great deal of attention as a way to keep pornographic material away from children, but probably will have much greater application in the information industry for protecting propriety data. Digital Equipment Corp. plans to integrate PICS into its AltaVista search engine so that a PICS server can control the type of material that reaches the user. IBM is also integrating the PICS filtering system in its product line, and other companies are following suit.

One disturbing aspect of the current standards development process is the lack of representation from the user community. While vendors are busily hammering out Web specifications, there is scarcely a single voice from the

US user community to provide input. European firms are more active, but overall the Web consortium remains a forum for suppliers and not their customers. To their credit, library organizations are involved with standards development, through groups such as the International Standards Organization (ISO), but the process has been described as being too slow to keep up with rapid technological changes in a world where the market tends to set standards. Technology standard development has been described as "fire, aim, ready." It is not unusual for the IETF to tell ISO what the standard will be, even as ISO is struggling with developing one. Another factor affecting search performance is user behavior.

Users Issues

As a result of numerous studies conducted when online searching was a library service, librarians know a great deal about user searching behavior. Librarians know that there are many types of users, and non-users, ranging from the technophorics to the technophobics. It is well-known that most users are influenced by the principle of least effort. Few people give much thought to the search engines they use, even though significant differences exist between them. They find what's handy or what they've heard about, often using the first browser they encounter, or always go to a favorite Web site. Many users are under the mistaken notion that they are searching all of cyberspace, or even the entire bibliographic universe. Thus, they reach the false conclusion that the results of a search are comprehensive. Users have difficulty in articulating information needs, formulating queries, refining searches, and they get easily sidetracked or lost in cyberspace as they follow hypertext links.

End user training might alleviate some of these problems. Librarians have long talked of end user training, but the old adage of bringing the horse to water but not being able to make it drink has been true. Sometimes, even bringing the water to the horse does not work. Some users just don't want to be trained. They want help as the problem arises. Other users simply do not want to leave the comfort of their office. Libraries may well want to consider distance education. Even when training occurs, it is surprisingly simplistic, the one-day quick -fix approach predominating.[14] If behavior cannot be changed, at least it can be studied so that other variables can be controlled. A promising development for studying user behavior is the ability to encode documents with hidden tags. Tracking documents that users retrieve and subsequently use can provide valuable data for rele-

vance assessment. The technique can also help with bibliographic control and protection of intellectual property.

Librarianship

The Internet presents many new opportunities for librarians. We have heard of many at this Symposium, and other suggestions abound in the Essen Symposium Proceedings from the last few years. At the risk of being redundant, let me list some suggestions specific to the scope of this paper.

Some major areas with the opportunity for library involvement are:

1. Evaluation (testing) of search engines, and implementation of local software agents.
2. Design recommendations for Web sites to enhance retrieval, e.g. better field formatting.
3. Bibliographic control at the firewall as well as archiving local electronic documents.
4. Indexing of Web document content, for vocabulary control.
5. Training the trainer (library school education).
6. Greater involvement in standards and product development.
7. Research and development of measures for cost-effective and cost-beneficial searching, as well as institutional cost containment.
8. Development and/or implementation of value-added services such as Internet access to library-based materials using collection specific intelligent agents, thesaurus construction, and developing resource lists with links to relevant sources.

A recent publication by the Public Library Association titled *Internet Job Searching* is a good example of a way to help make librarians' presence known, particularly outside of the traditional library walls. Another example promoting library use is a Web site called WebCats, set up by Peter Scott, a librarian at Berkeley. This utility contains links to all library OPACs with Web interfaces. Publishing in the computer literature also lends visibility. In the August 1996 issue of *Internet World* cyberlibrarian Cynthia James-Catalano provides an excellent summary of relevant skills possessed by librarians.[15] She states that "librarians have skills essential for doing research, whether on the Internet or in a more traditional library. We know how to evaluate information and how to group resources into similar

subjects. We can point researchers in the right direction and make intuitive leaps. Information seekers often don't know how to phrase their requests. Librarians help to narrow the query and provide more focused collection of materials to read through. In a world where time is money, librarians can save both." The problem, she states, is that librarians are victims of bad marketing.

Conclusion

In conclusion, end user searching appears to have reached a level where the tools for searching are as powerful, if not more so, than a librarian-mediated search. End users can achieve better results, if they want to. It is important that the tools be used properly. Unfortunately, it does not appear that librarians will be the only ones that teach the use of the tools. Other programs, such as Instructional Technology, are integrating Internet subject matter, library science, and training skills for the purpose of training the trainers. It is imperative that librarianship also becomes more active in domains of standards development, bibliographic control, and research. It is also important that librarians demonstrate the cost-effectiveness of their service to administrators who develop strategic plans and control the purse strings.

It is too early to sing the death dirge for libraries and librarians. Future directions for the Net are uncertain as parallel backbones are developed and financial considerations are starting to limit free access. Librarians have other business to conduct, thus will continue to have customers for the foreseeable future. For that matter, the publicity surrounding the Internet has generated more information users, who can be a potential market for library services. Directions also appear to include a more structured Web organization, with breakdowns into subject classified Web sites, not unlike the indexes used in libraries today.

Libraries and librarians must learn to diversify. Clinging to past glory can only mean failure. The business world has taught us that lesson. This does not mean that libraries should abandon the information business. Librarians as information workers should view new information technologies as opportunities for position enhancement. They need to turn problems into opportunities as they assert their role in the information world. How should this be done? A catchy slogan comes to mind. Let it begin with me!

References

1.   HELAL, A. H. and WEISS, J. W., eds. *Information Superhighway: The Role of Librarians, Information Scientists, and Intermediaries: Proceedings of the 17th International Essen Symposium, held in Essen, Germany, 24 October - 27 October 1994.* Essen: Essen University Library, 1995. p. XVIII.

2.   MCKINLEY, Tony. Web Searching: It's a text thing. *Imaging World,* 5, (9), pp. 53-55, 1996.

3.   BUERGER, Dave. Robots, spiders and broadcast technologies have their costs. *Network World,* 13, (26), p. 85, 1996.

4.   MCKINLEY, op. cit.

5.   MCKINLEY, op. cit.

6.   Our Current Search Engine Ratings. (1996, Sept. 10). http:www.monash.com

7.   Advertisement. *Internet World,* 8, (10), p. 91, 1996.

8.   UBOIS, Jeff. Agents of Change. *Internet World,* 7, (5), pp. 61 - 76, 1996.

9.   MCKINLEY, op. cit.

10. MCKINLEY, op. cit.

11. BAILEY, William J. Searching the World Wide Web for Drug information: Strategies for Locating Accurate and Scientifically Accepted Information.
      http://www.drugs.indiana.edu/pubs/newsline/searchin.html>

12. MCKINLEY, op. cit.

13. MESSMER, Ellen. The whole Web in its hands. *Internet World,* 13, (20), pp. 1, 14, 1996.

14. MAKULOWICH, John S. Training the Internet Trainer. *On the Internet,* 2, (4), pp. 11-12, 1996.

15. JAMES-CATALANO, Cynthia N. Look to the Librarians. *Internet World,* 7, (8), 1996, pp. 28 - 30.

297

The Intranet: Using the World Wide Web to Disseminate Information over the Internet

James A. West
True North Communications Inc., Chicago, Illinois, USA

James A. West has a B.S. from Illinois State University (1985) and an MLS from Northern Illinois University (1990). Since 1991 he has worked for different institutions in the information sector. Presently he is Senior Information Specialist at True North Communications. He is member of the Special Libraries Association and serves as Secretary of SLA's Advertising and Marketing Division.

Abstract

Many organizations have discovered that the Internet, and especially the World Wide Web, is an excellent way to disseminate information to their customers. Now they are using the same technology to disseminate information internally over internal internets known as intranets. Organizations are learning that using the technology of the World Wide Web is faster, easier, and cheaper compared with groupware packages like Lotus Notes. Intranets allow companies to present information that looks the same regardless of what type of computer they are using. Early applications on intranets make use of the Web's point and click interface to allow users to access information such as employee directories and human resource benefits. More complex tasks such as database development and two-way communications are being developed that make use of CGI (Common Gateway Interface) or JAVA programming.

The internet has experienced explosive growth over the last two years. The number of internet users is estimated to be over 30 million and is expected to reach 42 million people by 1998.[1] This growth is fueled by two developments. First, the technology has become more accessible, with the cost of computers has dropping considerably while continuing to increase in power. A pentium-based computer with 16 megs of RAM with a modem that has a baud rate of 28,800 BPS costs less today than an IBM 286 machine with 4 megs of RAM and a 2,400 BPS modem did just six years ago. Second, the software that runs these machines has become more easy to use as Microsoft Windows has moved in to dominate both the home and the workplace computer setup. Millions of new computer users now can access the internet with user-friendly graphical interfaces. This is especially true when accessing the World Wide Web. The Web offers an inexpensive, yet simple way to take advantage of the information available on the internet.

While the growth in internet users has begun to slow down, the trend now is for organizations to develop their own internal internets – called intranets. "An intranet is a private TCP/IP network that may or may not be connected to the internet."[2] Indeed, these corporate intranets are what is driving growth in the internet industry. The reason is that although the internet has generated a lot of hype, it has not created that much business. Intranets on the other hand have a built in legion of enthusiastic customers. This is because corporations have two traits that general consumers lack: a perceived need to connect to the Web, and a willingness to pay for the connection.[3] Eighty five percent of US corporations are implementing, piloting, or planning an intranet.[4] According to Zona Research, the market for intranet web servers will be nearly 5 times that for internet servers.[5] Half of all large corporations will have intranets by 1998.[6]

Intranets have the potential to facilitate information dissemination from all across the world.[7] They are places where people can meet and exchange information and discuss ideas at very little cost compared with developing proprietary software in-house or using groupware products like Lotus Notes. Although the costs of establishing intranets are expected to rise as the commercial market expands, the costs will remain lower than the alternatives. The first-year costs of an intranet can be as little as $10,000 but averages about $100,000.[8]

One of the biggest advantages of creating an intranet is that employees can access the site regardless of what type of computer they have. Web-based

299

technologies allow universal access independent of any specific operating system. Also, most companies already have the foundation in place such as TCP/IP to create an intranet.[9] With all of the hardware and the connections already in place, there is very little expense at the end user level to be up and running on the Web site.

Another advantage is that you can use a standard approach to creating and managing documents without having to worry about what kind of computer the end user has. Documents are created using HTML (Hyper Text Markup Language), which can be read by browsers on any type of machine.

A third advantage to establishing an intranet is that users also have access to a wide variety of applications such as forms and databases under a single interface. This interface is easy to control at the company level through the use of a company-developed home page.[10] By using Web browsers such as Netscape or Microsoft's Internet Explorer, end users can easily access the information available to them on their company intranet.

Creating an intranet does have some disadvantages. An intranet is not a turn-key solution.[11] Careful planning must go into what the company wants to accomplish before deciding to go with an intranet solution. Still, many companies are choosing Web technologies over groupware products such as Lotus Notes and Microsoft Exchange because they believe groupware products are more expensive and difficult to use. Notes also requires far more hardware resources in terms of memory and storage at the desktop than Web applications. Intranets offer a fairly straightforward system without all of the bells and whistles of groupware products.[12]

When it comes to creating an intranet, companies are taking a wide variety of approaches ranging from free-wheeling to authoritarian. Many companies go through the process of developing the sight without giving a thought to establishing guidelines for content.[13]

Traditionally, programmers sat for days learning how to work in a new programming language. Because it is so easy to create functional, great-looking web pages, many departments outside of IS are taking on the task.[14] One way to get people interested and involved in the web site is to let them create their own personal web pages. It is important to have a common look and feel to the web sight regardless of where the information is coming from. Often, an artist is used to design the look and feel of an intranet page, rather than a computer programmer.[15]

300

To build an intranet site, you have to work with computer/IS people, artists, and management. Overcoming departmental turf battles may be a difficult task. Often each department will have their own agenda. Also, many people have problems releasing information into the hands of anybody with access to the system.

Most intranets are built for two tasks: delivering information company-wide and upgrading software throughout the company.[16] The main goal of an intranet is to facilitate the dissemination of information to all employees on the network. It is important to get information up that will have immediate returns to the users. Because the technology is changing so rapidly, if you constantly wait to incorporate all the latest innovations, you will never get the project finished.

There are many things to consider when creating a web site, such as what browser do you want to use or what modem speed will users access the site. Although all browsers may be able to read HTML documents, they won't necessarily display them in the same way. Either Netscape's Navigator or Microsoft's Internet Explorer should be chosen. Netscape is by far the dominant browser in the workplace, but Microsoft's Internet Explorer is fast becoming a force to be reckoned with. Both are constantly upgrading and developing HTML standards that may not be compatible with other browsers.

Access speed is very important any time users will be accessing the site over a modem, because of the high concentration of graphics that is commonly found on the Web. Beware of spectacular graphics that take forever to download. Users will rarely wait thirty seconds for a page to be trans-ferred.[17]

Most intranets are not yet living up to their potential because of centralized, over-arching home pages. Often companies create a centralized home page and don't allow any default changes. Usually these home pages were created without any input from those who will be using the system. For example, the True North home page is strikingly beautiful. It is also filled with large graphical files that take a long time to load. The type face is very small (9 point), making it difficult to read and often difficult to pinpoint something to click on with a mouse. When a user goes to this home page, a script is activated that automatically resizes the window and eliminates many of the features of Netscape's browser such as a button bar and the URL location. Originally even essential buttons such as "Back" and

301

"Reload" were eliminated. Fortunately, they were put back when many users complained. Users have the option to change these defaults, if they wish. However, many do not know they can do this.

The content needs to be aimed at the needs of the employees. Often intranets are used as means to display new technologies without thinking about how those technologies benefit the user. For example, JAVA is often used to create special effects that do very little to improve communications. On the True North home page, JAVA was used to display a constantly changing banner that flashes names of web pages on the site but offers no explanation as to their content or method to find the page.

Once the site is up and running, it must be constantly maintained in order to keep people interested in returning. This does not necessarily mean that flashy graphics need to be changed regularly, or that gimmicks need to be created to hook people into the site. If the information is something that users need, they will return to it. More importantly, the information available on the site must be accurate and current. To accomplish this, individual web pages are often maintained by departments outside of IS, such as the Library/Information Center or Employee Communications.[18] The most effective web sites allow the departments that created the information to have control over both the content and how it is presented.

Eighty six percent of companies surveyed by InfoWorld magazine said they are using or planning to use their intranet to disseminate information. Employee manuals and directories are among the most common tools published on intranets. Having manuals online gives employees the ability to search for many commonly asked questions, freeing up staff to help people with more difficult problems.[19] The Information Center at True North has been charged with publishing a directory of all the company offices around the world. This directory is printed once a year and is in very high demand. One of the first intranet projects for the Information Center was to publish this directory on the corporate Web site. Using the Web to publish this information offers several advantages over the printed version. First, the information is continuously updated on the Web and therefore more accurate than the printed version. Second, the Web's ability to create hyper text links allows users multiple access points to the same information. The printed version is organized by region and country; the Web version allows this access, plus access by Type of Service and Account. With a click of a button, the user can easily find offices that are related to each other by a common name or service.

Another document that is accessible through the Information Center's portion of the site is the Worldwide Factbook. This document, which is produced by the Corporate Communications department, contains essential information that is used to describe our company to prospective clients. The information is continually updated to reflect any changes of information. The document is also available as a PowerPoint presentation, which can be downloaded with a single click of a mouse. Formerly, anyone wanting a copy of the presentation had to contact Corporate Communications.

The Information Center also uploads daily advertising columns from major U.S. newspapers to the Web site. Often these columns come with photographs and charts. Rather than downloading an ASCII text file of the articles, the department scans the original, including charts and photographs, and then uploads the information to the Web. A script was developed by the Information Systems department that automates the uploading process, which makes it easy for anyone to upload the documents.

So far all of the information presented has been in the form of static pages. In other words, the information remains the same for every user. Intranet technology offers much more than this. Sixty percent of companies survey by InfoWorld are planning to develop applications for their corporations' intranet site. Using CGI (Common Gateway Interface - typically written in PERL) or JAVA, programs can be written that will allow users to search for information and have that information sent back to the user. The information is presented in a Web page that the program creates "on the fly" depending on the request. Six out of ten companies using or planning to use an intranet are going to use JAVA in some form or another.[20]

One application that is being developed at True North is a company employee database that can be searched by the user. The user can search on any particular piece of information, such as employee name or phone number.

Another area under development at True North is the creation of discussion groups. Discussion groups give multiple users from around the world the opportunity to work together on specific projects around the company.

One portion of the intranet is being expanded to allow access for our clients, conceivably with dramatic implications for how work is accomplished.

The technology is rapidly expanding to allow the delivery of video and audio as well as text information. For example, users will be able to click on

a hypertext link and view the latest commercial that is being produced for a particular client. The Web offers the promise of videoconferencing. Unfortunately, these files are often so large they take forever to download. Once they are downloaded you have to have the software in place that is needed to run them.

In conclusion, the World Wide Web, and specifically intranets, hold great promise for sharing and disseminating information. But while artists can create beautiful web pages and computer programmers can supply fancy tools, librarians are needed to provide order that will create access to the information contained in the web site.

References

1. Growing Interest in Intranet Technology Sparks Surge in Registration for TCP/IP+ Intranet Expo. *Business Wire*, p7300064 July 30, 1996.

2. Meet the Intranet: Corporate Webs and Maybe the Next Thing in Client Server. *Computer Industry Report*, 31, No. 10, (June 30, 1996): p. 1.

3. MATSUMOTO, Craig. Intranets: Hope or Hyperbole? *Electronic Engineering Times*, No. 908 (July 1, 1996): p. 33.

4. 85% of Firms Using or Planning Intranet. *Newsbytes News Network*, August 5, 1996, p N/A.

5. MACMILEY, Michael. MacWeek Guide to Intranets; Ten Things to Consider When Building Corporate Intranets. *MacWEEK*, 10, No. 30 (August 5, 1996): p. 36.

6. RYAN, Margaret. Internet Fuels Intranet Inferno. *Electronic Engineering Times*, No. 908 (July 1, 1996): p. 30.

7. STROM, David. Art, Geeks and Power Ploys: How to Build your Intranet. *Forbes*, 158 No. 5 (August 26, 1996): p. S38.

8. MACMILEY, op. cit.

9. COHEN, Jackie. Groupware Faces up to Unexpected Challenge of Internet: the Intranet. *Bank Technology News*, 9, No. 5 p. 1+.

10. *Computer Industry Report*, p. 1.

11. STROM, op. cit.

12. WHEATLEY, Malcolm. Groupware's Uncertain Future. *Management Today*, May, 1996, p. 90.

13. PAUL, Lauren Gibbons. Access Karma. *PC Week*, 13, No. 32 (August 12, 1996): p. 37.

14. KORZENIOWSKI, Paul. Mastering the Webmasters. *InfoWorld*, 18, No. 32 (August 5, 1996): p. 53.

15. STROM, op. cit.

16. MATSUMOTO, op. cit.

17. SARNA, David E.Y. and FEBISH, George J. Intranets on the Runway. *Datamation*, 42, No. 11 (June 1, 1996): p. 21.

18. *Newsbytes News Network*, p N/A.

19. STROM, op. cit.

20. InfoWorld Study Shows Corporate Intranets Growing Faster Than Previously Thought. *PR Newswire*, p827LATU059 (August 27, 1996).

305

Providing Public Access to Information on the Internet

Paul Nieuwenhuysen and Patrick Vanouplines
University Library, Vrije Universiteit Brussel, Brussels, Belgium
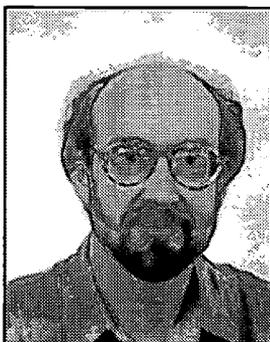
Since 1983, Paul Nieuwenhuysen is a member of the academic staff at the V.U.B. where he is head of the information and documentation department, as well as science and technology librarian, both functions in the framework of the University Library. He teaches courses related to information technology, retrieval and networks at the V.U.B. and at the Universitaire Instelling Antwerpen (U.I.A.). At the U.I.A. he received the degrees of Doctor in Science, the Belgian post-doctoral degree of Geaggregeerde voor het Hoger Onderwijs, and the inter-university postgraduate degree in documentation and library science. He is a member of several societies, and of the editorial board of four journals, and has been a consultant for various international agencies.

Patrick Vanouplines studied geography, hydrology, and computer sciences at the Belgian universities of Ghent and Brussels. He worked for ten years on several scientific projects about databases and mathematical modelling at the Laboratory of Hydrology of the Vrije Universiteit Brussel. During the same period he was also responsible for software and hardware at the same laboratory. Four years ago he moved to the University Library. As an information scientist, he performs online searches for information. He also investigates and publishes about the availability and quality of electronic information.

Abstract

More and more useful information becomes available online through the Internet, accessible by using only one integrated package of Internet client programs, with common and affordable hardware. Much of this information is free of charge. Therefore, offering public access to this information becomes feasible in libraries and similar environments.

To start with, this contribution points out interrelated problems and questions in this area. Acceptable solutions and answers depend of course on the environment. These questions can serve as a check list. At least, it is shown that many options exist and that offering and optimising public access is not straightforward.

Secondly and more specifically, we show how we try to assist users in searching for information available free of charge on the Internet: we have set up Internet software and World-Wide Web pages, we co-operate with similar institutes in the region, and we try to exploit some of the contemporary techniques (client/server architecture and HTML frames).

AN ADDITIONAL METHOD TO PROVIDE ACCESS TO INFORMATION

More and more useful information becomes available online on the Internet

- using standard, affordable hardware
- free of charge
- accessible by using only one integrated Internet client program, which includes client software for WWW, gopher, downloading by ftp, e-mail, Usenet,...

Therefore, offering public access to this information becomes feasible in libraries (see for instance Cole, 1995; Wörner, 1996; Sargent and McIvor, 1996) and in similar public environments, such as the post office and town hall. A published collection of non-technical American stories provides case by case examples of the positive effects in libraries (Valauskas and John, 1995).

307

Should libraries offer access for their clients, or can this be left to other institutes or departments, or to the initiative of the individual users? We think that libraries should be increasingly active in this area. The following are some motivations:

- In our experience, computer centres offer better access to network services than to information within the networks.

- The links with information in print and/or on CD-ROM become increasingly important (on one hand, many documents in print or CD-ROM refer to information sources on Internet, or discuss how to use the Internet, and on the other hand, many references to printed material can be found on the Internet, in particular of course in the form of bibliographic databases).

- Many potential users simply still lack the opportunity to access the Internet and should be stimulated to do so.

HOW TO OFFER PUBLIC ACCESS TO INFORMATION IN THE INTERNET?

When you want to offer access to information on the Internet, many questions and problems arise. Many decisions must be made, while no standard answers exist. Most of the systems (that we have seen) focus on offering Internet access hard- and software, and on the technical facilities (the Internet services), NOT on offering access to information. In other words, the Internet is discussed more in terms of the network communication protocols such as ftp, gopher and now WWW with HTML, rather than in terms of contents such as primary texts, bibliographies, fiction versus non-fiction, and so on. This can be intriguing but not very helpful for inexperienced end-users and certainly not for potential users. Some help screens are probably seen by novice users as a bunch of cactuses in the desert. Here we think not only about the present situation in PC laboratories, but also in libraries. For instance, one can search for information on the WWW with the help of so-called search engines. Offering a pointer to overviews of search engines is not sufficient. Many will appreciate some guidance through the contemporary form of the information jungle.

The following offers an overview of many interrelated problems and questions that managers have to face in this area. Acceptable solutions and answers depend on the local environment, infrastructure as well as culture. The many alternatives cannot be discussed and not even be mentioned

here. Standards do not exist in this area, in contrast with the growing number of international standards that keep the Internet running. However, at least this list of questions can form the basis for discussions, and it may serve as a check list in planning and optimising public access facilities. At least, this part should demonstrate that offering this kind of service is less straightforward than many computer-oriented persons may think and claim.

At the time of writing this document, many libraries have already started offering facilities of the type discussed here, but many more are still in the planning stage, such as most of the school and public libraries in our home country (Belgium) and more concretely for instance the central library of the University of Essen, where the yearly international library symposium takes place where this paper has been presented.

Answers to some of the questions in the context of a university library were formulated in a dissertation by a student guided by one of the authors of this text (Vandevenne, 1995); however, the evolution is so fast in this area that proposals and suggestions are quickly out of date.

Questions related to the workstations

Use the computers available for access to
* the online public access catalogue,
* or CD-ROM products,
or install dedicated (better?) machines?

Questions related to the microcomputer hardware

* How many PCs to install?
* What should be the specifications of the client computers?
* Which video displays to install?
* Which spatial resolution and number of colours to use?
* Which type of print facilities to offer? Colour or black and white only?
* Add a set of speakers or headphones, or disable sound?

Questions related to server computers

* Where to keep the Internet client software (for instance to browse WWW): on each client computers or on a server in the LAN?
* Where to keep the WWW pages offered by the library: on each client computers or on a server in the LAN?

309

- When using a server computer in the LAN: use an existing server (for instance one made available by a computer centre) or install an independent server (for instance at library level)?

Questions related to networks and data communication

- How fast should the Internet connection be? Which type of Internet access to offer: modem(s) or ISDN with SLIP or PPP; direct, continuous access;...?
- Which operating system and TCP/IP network stack software to use?
  - Microsoft Windows 3.1 with Trumpet Winsocket
  - Microsoft Windows for Workgroups, including TCP/IP software,
  - Microsoft Windows 95, including TCP/IP software,
  - Microsoft Windows NT Workstation, including TCP/IP software,
  - an operating system plus an integrated software package for network communication like PC/NFS, PC/TCP, ...

Questions related to the applications software

- Offer only one integrated Internet client program or several clients plus other programs?
- Which WWW client program to offer?
  At the time of writing this, the two leading and competing packages for the Microsoft Windows platform are Netscape Navigator 3.0 and Micro-soft Internet Explorer 3.0. (see for instance Hastings et al., 1996; Cly-man et al., 1996).
- Which viewer and plug-in programs to incorporate in the WWW browser? In particular: which telnet client to incorporate in the WWW browser?
  At least in one library we know of, a telnet client was not offered on purpose, but in this way and strange enough, access to classical online public access library catalogues was not possible from their public access PCs. This can be particularly annoying, because WWW offers so many links to character-based library catalogues.
- How to make the system (browser program) return automatically back to the right, locally installed home page after a session?
  Application of some additional program independent of the contempo-rary, popular browser client programs can solve this problem, but some time and computer skills are required to implement and test this solution.

310

So many will refrain from selecting this approach. We hope that future versions of the browsers themselves will offer this facility.

Questions related to the personal disk space for users

- Allow the user to save files to diskette, to upload files from diskette (which can be useful in the case of e-mail for instance), and to install additional software on the workstations?
- Offer personal, private hard disk space to the user? If yes:
  - Temporary disk space on the client computer, or more permanent, private space on a server in the LAN?
  - Which networking program to use for this?

Questions related to security risks on the client computers

- How to reduce the security risks on the client computer?
  - using facilities at the level of the operating system?
  - using facilities at the level of the Internet client/application programs?
  - by installing and using more specialised, additional security software?
  - ...
- In particular: Java and ActiveX programs form an essential component in an increasing number of information sources in the WWW (Vanouplines and Nieuwenhuysen, 1996); how to deal with these, knowing that they might damage the local, executing system: simply allow to download and execute?
  It is not simple to reach a high degree of security on PCs, not even with the most recent operating systems such as Microsoft Windows 95 (see for instance the ongoing discussions in the web4lib e-mail group, and Nott, 1996). We hope that Windows NT 4.0 on the server in combination with NT workstations will provide better facilities in this area.
- How to maintain disk backups?
- How to re-install disk backups when required?

Questions related to possible restrictions

- Offer the complete WWW or a (filtered) selection only?
- Allow Internet access only to adults?
- Develop and implement an Internet access and fair use policy? If yes: How to make this clear to users?
- Allow use without supervision or supervise users to avoid what is seen as "misuse" according to the local policy?

311

- Restrict the time of usage per user?
- Use reservation lists for the various public access PCs?
- Allow users to connect their own portable computer to the network?

Questions related to the lack of integration

- How to integrate access from each public access microcomputer to the various computer-based information sources, such as
  - one or several local library catalogues
  - information sources THROUGH (and also those ABOUT) the Internet (via WWW, gopher, ftp, telnet, locally accessible Usenet newsgroups, ...)
  - e-mail interest groups
  - CD-ROM products accessible through the local LAN
  - WAIS - or Z39.50 - based sources which lack a WWW gateway?
- How to make clear to the users that this lack of integration is here today, that it will probably persist in the near future, and that they have to cope with it?

Questions related to marketing and user guidance

- How to inform, sensitise, and attract potential users?
  - Distribute leaflets about the service?
  - Create and display attractive posters about the service?
  - Organise demonstrations and classes about the service?
- Where to place the Internet client computers within the public access area? Grouped or scattered around?
- How to receive feedback and evaluations?
- How to assist first-time and inexperienced users?
  - Offer printed leaflets?
  - Create and display posters with essential help messages near the public access PCs?
  - Offer help page(s) in the WWW browser software?
- How much effort should be spent in setting up WWW pages to guide users to information?
- How to assist patrons with various disabilities? (Deines-Jones, 1995)

Questions related to "free or fee"

- How to make clear the distinction between information sources which are directly accessible without passwords and free of charge, and those which are also publicly accessible, but more "hidden" and fee-based.

- Charge for usage of the online access facilities or not? If yes:
  - Which price to ask?
  - How to collect fees?
- Charge for usage of a printer or not? If yes:
  - Which price to ask?
  - How to collect fees?

Questions related to the library personnel management

- Is additional personnel or a shift of functions required
  - to install and maintain the Internet access system?
  - to guide users?
- How to train the personnel when their tasks change?

The following explains
- which kind of document ("pages") on WWW we have created to guide users to information available free of charge on the Internet, and
- how we offer these pages starting from the home page on dedicated PCs in the public access area of the library, and also as a part of the collection of WWW pages made available by the library staff to everyone on the Internet.

WWW PAGES WITH LINKS TO INFORMATION SOURCES

Internet access for the inexperienced user

Offering direct links to all of the more than 20 million WWW pages accessible these days is clearly impossible. Even offering links to secondary sources, to meta-information only, has become difficult if one wants to maintain references up to date. Therefore, it is important that some institutes keep pace with a particular area of interest. Then others can link to their site. As examples in Belgium, we mention the more or less centralised work of collecting links to library catalogues, and to Internet search tools. However, the need for more co-ordination is felt by the user groups of the Belgian research network (named Belnet). In 1996 negotiations have been started between the user groups and the ministry taking care of the national scientific network about funding to co-ordinate and improve access to information, besides the continuous improvement of the technical aspects of the network.

How to use hypertext / hypermedia is not understood immediately by inexperienced users, while public access computers are mainly aimed at this type of users. Therefore:

- Complete blocks or phrases should be linked, instead of small parts of a page (for instance: a menu line instead of only one word).
- Some guidance should be provided (for instance in a separate HTML frame, as outlined in the following).

An application of HTML frames and the client/server architecture

We have applied HTML frames in a client/server system in the LAN of our university, to provide guidance to the (potential) user on dedicated machines, as can be seen on the figures of screens captured from a display like the ones in the public access area of the library, when they show the home page in the WWW browser program:

Figure 1A

314
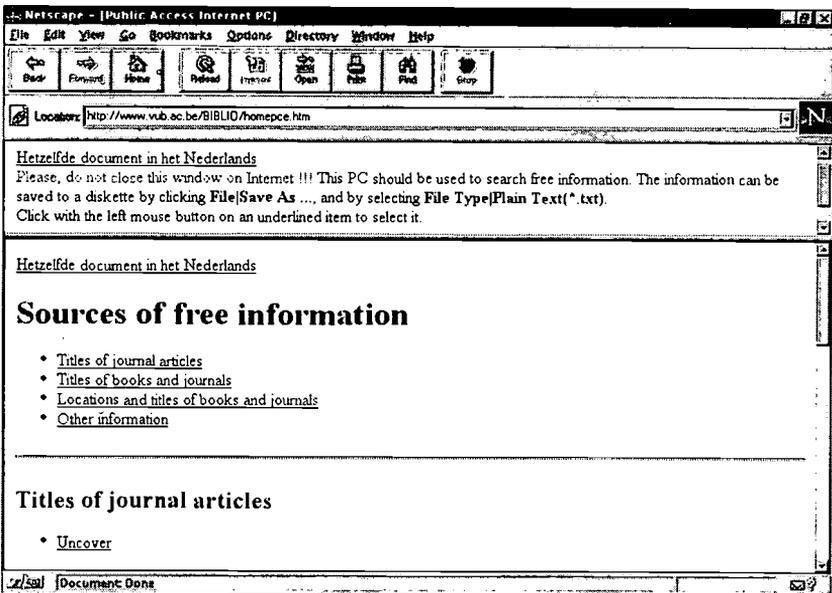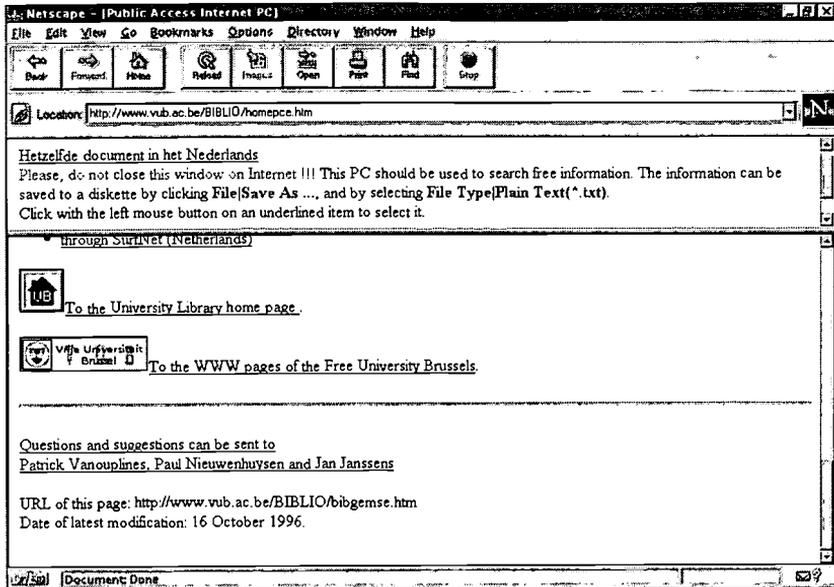
Figure 1B

Figure 1A and Figure 1B: Views on WWW-pages with links to information free of charge in the Internet, illustrating some points made in the text (about how to apply hypertext for first time users, about a help WWW-page in a separate first frame,...)

- The top frame explains the basics of how to use the system. It is offered (only) as a part of the home page of dedicated public access computers.

- The lower frame offers links to information sources. Scrolling in this frame leaves the top frame intact on the screen.

- The top frame can be made smaller by users who do not need basic help anymore.

- Both frames are kept on the same server in the LAN.

- The contents of the lower frame (but not of the top frame!) is also accessible as one of the WWW pages offered by the library to all users in the Internet.

315

The scheme in **Figure 2** should clarify this.
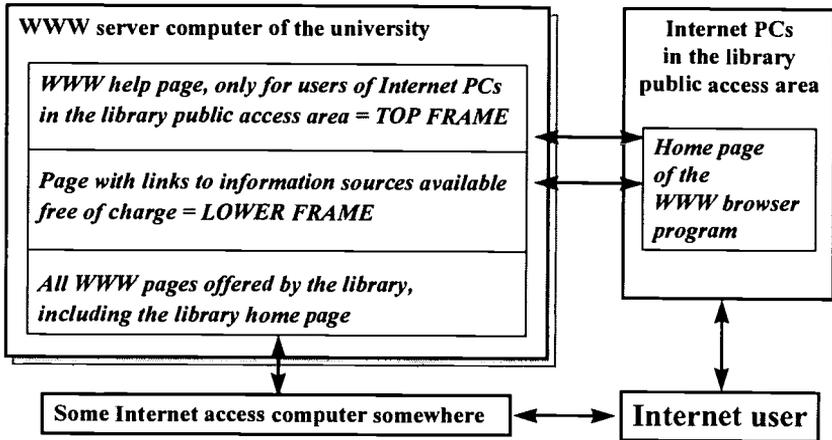
Figure 2: Scheme of the client/server system used to provide WWW pages to the public access PCs in the library, as well as to all other Internet users, adapted to the user group by the use of two HTML frames.

In this way, all frames and pages are maintained centrally on the server for easy maintenance and updating, while the guidance specific for users on the public access PCs will not disturb other, outside users who have probably on average more experience.

Note that the home page displayed on the public access PCs is not necessarily the home page of the library of the institute offering this facility. In fact, at the University Library of the V.U.B., we prefer nowadays to offer first links to information sources free of charge and below only one link to the home page of the library. Some motivations for this are:

- Offering general information, such as opening hours, is less relevant for users who know the way to the library, have entered and are already inside the library rooms, than for online, external, outside potential users.
- On the other hand, we want to use the limited number of public access PCs to confront potential users as directly as possible with the additional information on the Internet.

Ideally, several components of our system using HTML frames should be well co-ordinated to optimise the display:

- the contents and initial size of the top frame (about the system),
- the video display hardware (resolution and thus size of characters),
- the preferences set in the WWW browser client program concerning display formats of various types of texts (plain text, headings, lists, ...).

We prefer offering some help in this way, more than offering extra optional help buttons, because experience has learned that:

- Help offered on request is very often not used even when help is needed.
- Extra, additional help buttons may be confusing, because the help functions of the browser client software are normally also permanently available on the display.

User feedback through WWW and electronic mail

Users should be enabled to use the system itself
- to provide feedback to the manager(s),
- to ask questions about the system,
- to make suggestions for improvement.

This can be done by offering a hypertext link to a URL of the mailto: type. (See the figure of the display as an example.)

ACKNOWLEDGEMENTS

References and Further Reading

CLYMAN, John, MENDELSON, Edward, and NADEL, Brian. Web browsers: Microsoft takes the offensive in the browser battle with Netscape. *PC Magazine (USA)*, September 10, 1996, p. 39-41.

COLE, Timothy W. Mosaic on public-access PCs: letting the World-Wide Web into the library. *Internet Librarian*, January 1995, p. 44-49.

DEINES-JONES, Courtney. Opening new worlds of information: library technology and Internet access for patrons with disabilities. In: CAIS/ACSI 95, Annual Conference of the Canadian Association for Information Science, CONNECTEDNESS: INFORMATION, SYSTEMS, PEOPLE, ORGANIZATIONS, 7-10 June 1995, held at the School of Library and Information Studies, University of Alberta, Edmonton, Alberta. http://www.ualberta.ca/dept/slis/cais/deines.htm

HASTINGS, Bryan et al. Best Web browser. (Internet survival guide.) *Personal Computer World (U.S.A.)*, August 1996, p. 136-138.

MACE, Thomas. The perfect PC connections: the Internet connection. *PC Magazine (USA)*, p. 196-198.

NOTT, Tim. Protect and survive. Hands on. Windows 95. *Personal Computer World (U.K.)*, September 1996, p. 248-250.

Publib-net@nysernet.org
An e-mail interest group about Internet applications in public libraries.

SARGENT, Goff and MCIVOR, John. Public access information. A prototype Web kiosk. *Managing Information*, April 1996, p. 32-35.

Sources of free information.
http://www.vub.ac.be/BIBLIO/homepce.htm

The Library Web Manager's Reference Center
http://sunsite.berkeley.edu/Web4Lib/faq.htm

VALAUSKAS, Edward J. and JOHN, Nancy R., eds. *The Internet initiative: libraries providing Internet services & how they plan, pay, and manage.* Chicago and London, American Library Association, 1995. 221 p.

VANDEVENNE, Johan. Toegang tot gratis informatie op het Internet. Eindverhandeling Gediplomeerde in de Gespecialiseerde Studie Informatie- en Bibliotheekwetenschap, Universitaire Instelling Antwerpen (U.I.A.), Belgium, 1995.

VANOUPLINES, Patrick and NIEUWENHUYSEN, Paul. Highly interactive servers in the World-Wide Web: a new type of information source. In: *Online Information 96: Proceedings of the 20th International Online Information Meeting, London, December 1996.* Edited by David I. Raitt and Ben Jeapes. Oxford, Learned Information. (Accepted for publication.)

Web4lib@library.berkeley.edu
An e-mail interest group about WWW applications in libraries. Also accessible as a Usenet newsgroup.

WÖRNER, Christine. Die Nutzung von Internet in Öffentlichen Bibliotheken. (The Internet use in public libraries.) *Bibliothek: Forschung und Praxis*, 20, (1), pp. 9-39, 1996.

Document Delivery towards the Year 2000

Sue Orchard*

UMI, Cuckfield, West Sussex, United Kingdom

After graduating in German and Russian from the University of Aston in the UK, Sue Orchard joined UMI in the early 80s as a Sales Development Executive. She is now the Sales Director for IPI, the company which represents UMI, a Bell & Howell company of Ann Arbor, Michigan, in Europe, the Middle East, Africa, Australasia and the Far East.

Abstract

In my paper entitled "Document Delivery in the 1990s: Current Aspects and Future Trends" delivered at the 1995 Essen Symposium, I outlined the document supply services and formats available from UMI and discussed the issues surrounding the area of document supply as a whole.

This paper will give an update on developments over the past year and look forward to the year 2000, giving UMI's vision of the future of document supply.

---

* Sue Orchard could not attend the Symposium due to extraordinary circumstances. The paper was read by Elizabeth Hunt.

At the 18th International Essen Symposium held in October 1995, I presented a paper entitled "Document Delivery in the 1990s: Current Aspects and Future Trends"[1]. In my paper, I gave an outline history of UMI showing how we had evolved into the company we are today. I took a look at the document supply options available as at October 1995 and the various services and formats on offer. I discussed the relative merits of the different formats including paper, microform, CD-ROMs and online.

I then went on to look at electronic document delivery and the different options available and discussed the advantages and disadvantages of the different methods of access.

Key Criteria in Document Provision

I would like to go through the key criteria which I outlined in my paper last year as being the vital issues to be considered when choosing the best means of access to documents for your institutions for the future:

1. Just in case vs. just in time provision.
2. Level of expected demand.
3. The need to provide end user access.
4. The need to provide original article copies.
5. The desire to provide the fewest possible number of different interfaces.
6. The need to download articles to disc.

So how have things evolved since I outlined these key criteria a year ago?

Let me look at the six items individually.

1. **Just in case vs. just in time provision.** The jury is still out on this issue and there is still a very heated debate going on about this subject at every seminar that I go to that deals with document delivery. This time last year, a lot of libraries were really bullish about just in time provision. After having experimented with this for a while, I know that some of them are returning to a more balanced portfolio with core collections being maintained for high demand materials and other items being put through on-demand services.

---

[1]   ORCHARD, Sue. Document Delivery in the 1990s: Current Aspects and Future Trends. In: *Electronic Documents and Information: From Preservation to Access; Proceedings of the 18th International Essen Symposium, 23-26 October 1995.* Essen: Universitäts-bibliothek Essen, 1996. pp. 96-106.

321

2. Level of expected demand. For the more esoteric titles or for titles which are in much lower demand, a pay as you go service is obviously a cost effective option. However, when you get beyond a certain level of demand, subscription based access to journal information via paper or electronic means becomes much more cost effective. It is, of course, difficult to assess the expected demand sometimes. For instance, if you put a journal issue on the shelf in the library, how can you tell how many times it is consulted? How can you tell which articles are of importance? How can you tell which articles have been photocopied? Particularly with undergraduate use of journals within a library, it can be very difficult to assess how much they are being used. I suppose you could look at the journal and see if the cover looks well thumbed or if it is still pristine, but that isn't really a scientific method for calculating which journal should be kept in the library or not. I think that some other libraries, who went ahead and cancelled large numbers of paper subscriptions to periodicals on the basis that they would substitute this with article delivery on demand, were actually quite surprised at the level of demand for article copies from the undergraduates. At a lot of places, the undergraduates do not have access to departmental funds for obtaining article copies on demand. In such circumstances, the undergraduate community missed out quite substantially due to the lack of provision of periodical literature.

3. The need to provide end user access. A lot of universities now are providing access to databases not only via the departments but also providing terminals in student residences. If databases are made available in this way, this then increases the demand for the supply of the documents themselves. As networking increases, so does the demand on the periodical literature.

4. The need to provide original article copies. This seems to vary from institution to institution. Some institutions are perfectly happy with full text ASCII articles. These can be provided very easily on networks and they are a cost effective way of providing journal literature to people. However, they do not provide any of the graphics and in some cases and in certain subjects, this is vitally important for the interpretation of the text. This is why the scanned image databases that we produce like *Business Periodicals Ondisc* have been hugely popular wherever they have been installed.

It is possible to network such systems and this service goes under the name ProQuest PowerPages. With the latest version of the ProQuest

PowerPages software, you can load the CD-ROMs containing the scanned images of the periodicals into a jukebox and you can provide local viewing of the required articles throughout the network. This means that researchers can sit at their terminals in their departments or in the student residences, carry out searches on the abstract and index databases and request the scanned image of the required articles to come to their own local screens. They can then either read them on the screen or print them out on a local laser printer. This provides you with a cost effective method of networking original journal articles themselves. It is possible to network these image databases to more than one institution and we are discussing possible consortium purchases of these systems in both North Rhine-Westphalia and Bavaria.

In addition to customers' desire to network the scanned images of the higher demand publications throughout their institutions through systems like ProQuest PowerPages, we have also noticed a huge increase in demand for original article copies through our document supply service, UMI InfoStore. The vast majority of people do prefer copies of the original articles themselves complete with article layout, graphics, photos etc.

The document delivery services themselves have all been expanding the products and services that they offer and offering faster turnaround for article copies which is vital if institutions are using such services as a replacement for local holdings.

I'd like to tell you a little bit about a special deal which we have set up with the CONZUL group in New Zealand for document delivery. CONZUL stands for the Committee of New Zealand University Libraries and it covers all seven universities in New Zealand. In return for the commitment of the seven university libraries in New Zealand to use our UMI InfoStore document delivery service, we have negotiated a special price with them for the supply of article copies. In order to provide the fastest possible turnaround of article copies to New Zealand, it was necessary to make some very careful calculations regarding time differences to let the New Zealanders know the optimum time for placing orders with UMI InfoStore in order to receive the article copies on their desks the following morning. We deliver articles to them either by fax or utilising RLGs Ariel scanning software. We will be providing them with electronic copies of our catalogue so that they can load them onto their own OPACs and they can then place orders online with us. In addition,

we have initiated an Internet discussion group with them whereby they can post any questions they have regarding the services and we can supply them regularly with updates on the latest developments in the products and services offered by UMI InfoStore. We set up this system fairly recently but we have had some initial very positive reaction to it.

5. **The desire to provide the fewest possible number of different interfaces.** The major buzz word now seems to be "Web interface". Institutions increasingly want to offer the fewest possible number of interfaces to access the subscribed databases. A lot of companies are developing Web based products and UMI is no exception to this with our ProQuest Direct service, more of which later.

6. **The need to download articles to disc.** There are licensing restrictions in downloading certain formats to hard disc and full text ASCII articles offer the best and easiest format for downloading articles to hard disk or to floppy disc.

These six items which I outlined in my presentation last year still cover the key issues involved in deciding the type of products and services required by libraries and information centres around the world. So what can we expect as we head towards the year 2000?

As I mentioned, Web based interfaces seem to be the way that a lot of organisations and institutions are heading at the moment. What sort of products and services can we expect to see with these Web based interfaces and how will this effect the whole area of document delivery?

Institutions and organisations are moving more and more towards online instant access to as wide a variety of information as possible. However, by online, I don't mean the kind of system that has traditionally been offered by companies like Dialog. Those systems were excellent in the past for experienced online searchers who could locate immediate information from a variety of sources with a single well conducted search. However, they were not meant as end user systems.

ProQuest Direct

The new Web based systems are meant to be end user systems and have been put together as such. These new systems take advantage of all the advantages of online searching: currentness, comprehensiveness and the capability to search several databases simultaneously. I would like to de-

scribe our ProQuest Direct system which is a leading edge system providing access in a variety of ways to a vast amount of data.

UMI has been offering ProQuest Direct in the United States for the past year and the publications and sources covered have expanded rapidly in that time. ProQuest Direct is a client/server host system which offers both a Windows based interface, which is available now, plus a Web interface which is due to be launched next month.

This system provides online access to UMI's electronic collections and, following agreements with other information providers, we can provide online access to other electronic collections of information as well. The data are offered in a variety of formats and there are different pricing levels for the different formats. Every item is fully copyright cleared.

So what data are actually included? We have divided our data up in two distinct ways. You can access data by searching specific databases with which you are already familiar like ABI/Inform. You will recognise some of the databases and some of them are new to UMI and are only available through our ProQuest Direct system. The other method of access to data that we are offering is via specific subject packages, for example titles which are specific to sales or marketing departments, human resources departments, finance departments and legal departments within organisations.

Traditionally, our coverage has been very strong in the business, economics and management areas and we are moving into the financial information area as well. Additionally we will be focusing on computing, technology and telecommunications plus medical/pharmaceutical and engineering.

UMI recently announced the acquisition of DataTimes Corporation, an Oklahoma based company which has been providing online business information services. DataTimes has been one of the leaders in providing news content in electronic form and this complements perfectly UMI's recognised content strength in periodicals and journals. DataTimes has proven processes for handling electronic data and generating full text databases while UMI excels in producing images and graphics electronically as well as abstracting textual content. Like UMI, DataTimes collects information from publishers, adds value to that information and distributes it out to customers in different ways.

The DataTimes content base includes regional, national and international newspapers, newswires, trade publications, newsletters, broadcast tran-

scripts and financial statements and company profiles. Content is received from over 5,200 information sources and includes more than 50 million full text documents. DataTimes does have excellent coverage of non US materials. For example, it covers over 50 German titles covering various aspects of different businesses. Quite a few of these titles are available in full text formats.

In addition, in a joint venture between DataTimes Corporation and News International, a service called NewsEyeQ is offered, which is an online business information service. This service is aimed at the business end user and is designed to provide indepth information as well as quick reference items. We intend to load the DataTimes data into ProQuest Direct (PQD) and to provide further subject specific packages.

What sort of formats are offered by PQD? Users can access information in a variety of formats. We offer 5 different formats although, due to publisher restrictions, you won't find that every format is available for every item. The 5 formats offered are: citations, abstracts, full text, images or a text and graphics format which gives you the full text of the article and the option to display each photo, graph, chart, table and illustration. With text and graphics, all non-text elements (photographs, charts, illustrations, graphs, tables and formulae) are included as image files with side bars, footnotes, headnotes, references etc. in searchable ASCII format. Once you have carried out a search and retrieved results, you can see at a glance which format is available for each reference.

Once you have decided which format you would like to access, there are various ways of obtaining the data: 1) you can bring the information up onto the screen in front of you; 2) you can print it out on a local printer; 3) you can request a fax copy to be sent to you; 4) you can request an off-line print to be sent by post. There are obviously a variety of charging mechanisms depending on the level of access required to the system, the number of users, the amount of data required to be accessed etc.

At present, access in the United States is provided via the UMI Net which is a value added network with local access numbers all over North America and this access method only requires a modem and phone line. UMI Net utilises the Compuserve network. PQD customers are not required to have an account with Compuserve; rather, UMI utilises Compuserve's expansive infrastructure to offer dial up connections direct to UMI. Access to PQD can also be obtained via the Internet through a local service provider like

Compuserve. Finally, you can use an ISDN link for a direct connection to UMI. At present, we are offering a Windows based interface which is our own proprietary software but from next month, as I mentioned, we will have a Web interface as well.

If copies of required articles are not available through the ProQuest Direct system, you can, of course, use the UMI document delivery service from the UMI InfoStore.

Towards 2000

So what is our prognosis for the years leading up to the year 2000? Web based systems will become more and more important over the next 2 or 3 years. By the end of the century, systems like UMI's ProQuest Direct will be considered as the norm for seamlessly searching and accessing data. When you look at current online service revenues for example, financial and company information products and services account for the vast majority of electronic information revenues and that will continue. Real time or as near real time information as possible will be the requirement especially in the corporate sector. In the academic sector, there will obviously still be a need for historical data.

How will this affect CD-ROM? I think that this will very much depend on the type of environment. The corporate sector will certainly require the very latest information and be prepared to pay for such services. End user access will become the norm and the systems will be designed with this in mind to be as end user friendly as possible. Services that offer as wide a variety of data as possible but equally which are either totally customisable or with small specific subject blocks which people can choose will become of very great importance. People will come to rely on these specific sources of information and know that they provide them with the very latest information precisely on their areas of interest. Subject packages like our human resources package for example will keep human resources professionals up to date with the very latest developments in their field and will also enable them to keep an eye on what rival companies are doing.

In the academic sector, there will have to be the usual fine juggling act between the desirable and the attainable. As you well know, CD-ROM is an excellent storage medium and, with the new DVD discs which offer up to 12 times better storage capacity than the current CD-ROMs, I believe that CD-ROM will certainly be around either as a storage medium or a delivery

medium for some time to come. These new discs are expected within 12-18 months and, once an industry standard has been established, UMI will be utilising them for our scanned image databases.

Again in academic institutions, delivery of data to desktops in a timely fashion will be extremely important. Network connections within academic institutions will need to be improved in order to provide rapid access to graphical information. Most networks are currently adequate at least for textual information. For lesser used material, the provision of articles and other documents through just in time delivery services like UMI InfoStore will continue to grow.

In conclusion, I would like to note that the pace of change in our industry is accelerating the whole time and, despite what I have said today, there might be some brand new technology around the corner that will take us all by storm. Having said that, although people are heading more and more towards using electronically housed collections of information that are accessible, retrievable and deliverable without regard to the traditional limitations imposed by time or location, we have still got a very long way to go before the concept of the virtual paperless library becomes a reality for the vast majority of people.

Finally, I would like to thank you for your attention and to end by wishing Dr. Helal a very happy and fulfilled retirement.

Towards a Worldwide Library:
A Ten Year Forecast

Conference Summary

Susan K. Martin
Georgetown University, Washington, DC, USA

Dr. Susan K. Martin attended Tufts University, with a B.A. in Romance languages with honors, received her M.L.S. from Simmons College, and her Ph.D. from the University of California. Currently she is University Librarian at Georgetown University. She has held this position since 1990, and came to it from the position of Executive Director of the National Commission on Libraries and Information Science, in Washington, DC. Prior to that, she was on the staff of several university libraries, most recently in the position of Director of the Milton S. Eisenhower Library at Johns Hopkins University, a post she held from 1979 to 1988. Library automation and networking have been the focus of most of her articles and books.

The year is 2006. I am about to join the ranks of my friends here who are gloating about their impending or actual retirements.

Librarians have taken the challenges presented at Essen in 1996 very seriously, with the result that libraries, while often having relatively smaller budgets than they did in 1996, have become the key organizers of information in this Information Age.

After years of Internet and Web development (or their successors) with no controls, librarians have fully adopted the role of sorting through the Internet to identify those resources that can be considered to be formally published. The intellectual effort entailed is something that wasn't required in the paper environment, with the mass of approval plans for purchasing,

and the private sector has not yet realized that there is a potential product to be sold - creating the next challenge for libraries. In general, the economics of information continues to be a problem, as does the topic of intellectual property rights (and these will be addressed at the 2007 Essen Symposium).

Based upon the efforts of librarians, the information highway has been divided logically, with formally published electronic resources accessible as a corpus separate from the vast chaos of unpublished and ephemeral messages, listservers, advertisements, etc. At the same time, print-on-paper publishing, which was explosive in the 1990s, is still enormous, but is beginning to level off. A real problem for information users is the determination of what is on the net, and what is not.

The bandwidth problems that plagued much of the world in the use of the Internet has gradually been addressed. The private sector worked with governments throughout the world, taking advantage of increased mini-aturization and cable technologies, so that by now, in most industrialized countries, response time is tolerable for scholarly and educational use of digitized information.

With the Web divided to provide less chaos, and with more bandwidth available, efforts of organizations such as JSTOR and LAIRD, and of libraries such as De Montfort, have grown and flourished. There has been a revolution in storage technologies, and data can now be stored at the atomic level. With the efforts of libraries, collaboratives, publishers, and the private sector, hundreds of millions of documents and images are accessible in digitized form. Publishers of journals are slowly beginning to repackage their products, usually by such techniques as putting individual articles on the Internet (for a fee); especially in the case of expensive subscriptions, where most libraries had cancelled journals, this approach seems to be received well by scholars, most of whom are granted subsidies for this access.

Voice recognition and teleconferencing are proving valuable additions to the tools available to libraries. Users can now query the Internet's various browsers by asking questions verbally; unfortunately, the difficulties of keyboard queries extend to verbal questions - garbage or irrelevant information is often the result. Fortunately, voice response is not yet so sophisticated that it allows computers to adopt a condescending tone in their replies to naive questions.

Teleconferencing has supplemented the Internet in allowing libraries to serve their users. With workstations equipped with 2-way audio and video, users can carry on conversations with reference librarians at their local libraries, or at remote locations. The National Library of the United Kingdom uses this capability extensively, enabling it to serve its population adequately despite a significant decrease in staff size and budget.

The widespread availability of universal translators (which used to be called "cross-lingual searching") and the Z39.50 protocol descendants have made possible true worldwide library access. The vast information re-sources described earlier can all be accessed on the Web, from any point on the globe. It is still up to the local information-providing authority (usually a library) to determine whether to subsidize access to pay or subscription resources. When users search the universal library server on the Web, the hits will inform them whether the information is available at no charge from the provider; requires a one-time fee, which may or may not be subsidized by the user's home institution; or requires a subscription, who also may or may not be subsidized.

National boundaries are being transcended by the Information Age - particularly heralded by software which not only accepts terms from many languages, but incorporates what was known in 1996 as metasearch engines into a very user-friendly and culture-normalizing structure for people worldwide.

Increasingly, there is a general recognition of the major contributions made by the nineteen Essen Symposia, and we are delighted that Dr. Helal has continued his efforts to this day and into the future, after his early retirement in 1996.

331

Index

Database
- construction   156 ff.
- of local history   231 ff.
- personal ...   164 ff.

De Montfort University   180 ff.

Digital
- information   136 ff., 165 ff.
- library   101, 148 ff., 156 ff., 180 ff.
- library architecture   180 ff.

Digitization   81, 139, 231 ff.

Distributed Link Service   219 ff.

Document delivery   23, 81 ff., 139, 200, 277 ff.

Downsizing   4 ff., 69, 118

Electronic
- forums   152 ff.
- library   66, 83 ff., 141 ff., 180 ff., 196, 234
- publishing   79 ff., 202 ff.,
- warehouse   154

End user searching   5 ff., 241 ff.

Evaluation   117, 156 ff.

Globalization   103 ff.

Gopher   132, 203 ff., 243
- as KWIC index   203 ff.

Groupware   254 ff.

Heritage Lottery Fund   232 ff.

Holography   149

HTML *see* Hyper Text Markup Language

Hyper Text Markup Language   151, 182, 249, 256 ff., 263 ff.

IBM   54 ff., 180 ff., 206 ff., 249

Indexes   99, 138, 157, 194, 206 ff., 223 ff., 252
- manual versus electronic ...   202 ff.
- traditional ...   216

335

BGHZ
auf CD-ROM

Die richtige
Entscheidung!

BGHZ
Entscheidungen des
Bundesgerichtshofes
in Zivilsachen
Auf CD-ROM

FOLIO

Carl
Heymanns
Verlag

Power Up
to Integrated Information Management
with EBSCO.

338

BIBOS:IV

Modulare Systeme für Bibliotheken

Ein System entsteht

alle Bibliothekstypen – alle Bibliotheksgrößen – UNIX – Client/Server – Windows – modularer Aufbau

BIBOS:IV-SPEZIFIKA

- ⬧ **Skalierbarkeit:** anpaßbar an verschiedene Bibliotheksgrößen

- ⬧ **Modularität:** auch einzeln einsetzbare Module und dadurch mögliche Einbindung individueller Komponenten

- ⬧ **Variablität:** einsetzbar für alle gängigen Bibliothekstypen sowie auch für Archive, Dokumentationen und Museen

- ⬧ **Standard:** Standardkern mit parametrierbaren Zusatzmodulen bzw. Individualkomponenten

- ⬧ **Verbund:** BIBOS:IV wird ein Verbundsystem mit unterschiedlichen Teilnahmemöglichkeiten

BIBOS:IV-MODULE

- ⬧ **Erwerb**

- ⬧ **Inventarisierung**

- ⬧ **Katalogisierung**

- ⬧ **Informationsdienst**

- ⬧ **Entlehnung**

- ⬧ **Zeitschriftenverwaltung**

- ⬧ **Organisation**

- ⬧ **Gebührenverwaltung**

- ⬧ **Budgetcontrolling**

- ⬧ **Personalverwaltung**

BIBOS:IV-TECHNIK

- ⬧ **Offenheit:** Kommunikationsmöglichkeit mit Fremdsystemen

- ⬧ **Unabhängigkeit:** unterstützt verschiedene Hard- und Softwareplattformen

- ⬧ **Client/Server:** skalierbare Server unter mehreren Betriebssystemen bei verteilter Anwendungsarchitektur

- ⬧ **GUI:** grafische Benutzeroberfläche mit Einbindung in MS-Windows

- ⬧ **Schnittstellen:** Unterstützung genormter Formate und Schnittstellen

Elektronische Datenverarbeitung Gesellschaft m.b.H.
Unternehmensbereich Bibliothekssysteme
Ihre Ansprechpartnerin: Dr. Christa Reich
Telefon (+0 43 1) 599 07-1185; Fax (+0 43 1) 599 07-1422
A-1060 Wien, Hofmühlgasse 3–5

Ein Softwareprodukt
EDVg-Unternehmensgruppe

Elsevier Science on the Internet

Your comprehensive and easy-to-use guide to the world-wide range of Elsevier Science products and services.

Visit Elsevier Science on the Internet and access a unique repository of information covering the entire scientific spectrum. Our time-saving search facilities will lead you to our frequent updates in seconds.

Main features include:

Alerting and awareness facilities for new and forthcoming publications.

Fast, time-saving search facilities.

Frequent updates.

http://www.elsevier.com

http://www.elsevier.nl

ELSEVIER   PERGAMON   NORTH HOLLAND   EXCERPTA MEDICA

340

ALEPH

Automated Library Expandable Program

EX LIBRIS S.A.

ISI Gateway
Your link to a spectrum of scholarly research

◆ Current Contents® ◆ Clinical Medicine ◆ Science Citation Index®
◆ Abstracts ◆ CD-ROM ◆ Intranet ◆ Social Sciences ◆ Internet
◆ Diskette ◆ ISI Document Solution™ ◆ Life Sciences ◆ Chemistry
◆ Arts & Humanities ◆ Citation Indexes ◆ Bibliographic
Information

Link yourself to the world's leading journals through the ISI
Gateway. Access current and retrospective information
through ISI's table-of-contents and citations databases. For
forty years, the scientific, academic, industrial and business
communities have used the ISI Gateway to retrieve ground-
breaking, incisive and peer-reviewed literature.

Now you can too.

For your free copy of ISI's catalogue,
please contact **ISI Europe**

Tel: +44 1895 270016
Fax: +44 1895 256710
Email: uksales@isinet.com

ISI

Institute for Scientific Information®

Brunel Science Park, Uxbridge UB8 3PQ United Kingdom

Erleichterung
in der Bibliothek!

*L*ange & Springer ist einer der führenden Dienstleister für wissenschaftliche Bibliotheken. Wir besorgen Ihnen Zeitschriften, Fortsetzungen, Monographien und elektronische Datenträger.

→ Auf individuellen Service legen wir größten Wert. Deshalb werden Sie bei Lange & Springer stets von Ihrem persönlichen Kundenbetreuer bedient.

→ Wir machen Ihnen gerne ein unverbindliches Vergleichsangebot. Rufen Sie uns an oder schreiben Sie uns!

L&S

Lange & Springer

LIB-IT GmbH informs:

Over ten years of experience and know-how as well the latest development methods and technology have been incorporated into the LIBERO Library management system. Clear and concise screen-design was as important to us as functionality, flexibility and security. The LIBERO Library management system is a tool, which will provide higher effiency hand in hand with cost reductions through the use of modern technology in your library:

- Cataloguing (MAB2, USMarc, Unimarc)
- Acquisitions and budget management
- Retrieval and OPAC (incl. Z39.50)
- Circulation, Member maintenance
- Periodicals (incl. maintenance, acquisitions, binding)
- Parameter maintenance, security maintenance
- Reports and statistics (incl. SQL and ODBC Interface)
- Remote Services (stock transfer, mobile library)
- Internet integration in all relevant functions
- CD-ROM network integration with ULTRA*NET

LIBERO can be used for all kinds and all sizes of libraries. There is a single user version as well as a client/server version with hundreds of users. **LIBERO** was developed under the most modern Windows technology and runs on standard hardware (e.g. PC network with Windows NT or Unix).

LIBERO makes use of a powerful Database Management System. Its client/server architecture ensures high performance, elastic scalability for growth and easy system management. Shadow and fail-safe technologies keep the data accurate and available around the clock. Portability and reliability are additional advantages. The Database System has implemented ANSI standard and SQL, plus ODBC, relational capabilities and implemantations of OCX and VBX controls to call Window DLL's (for applications developed under VisualBasic, Visual C++ etc.)

For further information please contact:

LIB-IT GmbH

Bibliotheks EDV-Systeme
Rosenweg 5/2, 74385 Pleidelsheim / Germany
 el.: + 49 - 71 44 - 82 12 46 / 47 , Fax: + 49 - 71 44 - 82 12 48
Email: LIBIT.Koch@t-online.de

CD-ROM Netzwerk

Ultra*Net

Für
MS-DOS, Windows und
OS/2
Mit Unterstützung für
VAX, SUN, HP

R+R

R·R MESSTECHNIK UND HANDEL GES.M.B.H

347

349

Vol. 6
New Trends in Electronic Publishing and Electronic Libraries
Essen Symposium
29 Aug. - 31 Aug. 1983
3-922602-07-X (out of print)

Vol. 7
Local Library Systems
Festschrift in honor of Frederick G. Kilgour
Essen Symposium
24 Sept. - 27 Sept. 1984
3-922602-08-8

Vol. 8
Future of Online Catalogues
Essen Symposium
30 Sept. - 3 Oct. 1985
3-922602-09-6 (out of print)

Vol. 9
Impact of New Information Technology on International Library Cooperation
Essen Symposium
8 Sept. - 11 Sept. 1986
3-922602-10-X

Vol. 10
International Library Cooperation
Festschrift in honor of Günther Pflug
10th Anniversary Essen Symposium
19 Oct. - 22 Oct. 1987
3-922602-11-8 (out of print)

Vol. 11
The Impact of CD-ROM on Library Operations and Universal Availability of Information
Festschrift in honor of Maurice B. Line
11th International Essen Symposium
26 Sept. - 29 Sept. 1988
3-922602-12-6

Vol. 12

Developments in Microcomputing : Discovering New Opportunities for Libraries in the 1990s

Festschrift in honor of Richard De Gennaro
12th International Essen Symposium
23 Oct. - 26 Oct. 1989
3-922602-13-4

Vol. 13

Information Technology and Library Management

Festschrift in honor of Margaret Beckman
13th International Essen Symposium
22 Oct. - 25 Oct. 1990
3-922602-14-2

Vol. 14

Libraries and Electronic Publishing : Promises and Challenges for the 90's

Festschrift in honor of Richard M. Dougherty
14th International Essen Symposium
14 Oct. - 17 Oct. 1991
3-922602-15-0

Vol. 15

Opportunity 2000 : Understanding and Serving Users in an Electronic Library

Festschrift in honor of Herbert S. White
15th International Essen Symposium
12 Oct. - 15 Oct. 1992
3-922602-17-7

Vol. 16

Innovation for Information : International Contributions to Librarianship

Festschrift in honor of Ahmed H. Helal
3-922602-16-9

Vol. 17
Resource Sharing :
New Technologies as a Must
for Universal Availability of Information
Festschrift in honor of Hans-Peter Geh
16th International Essen Symposium
18 Oct. - 21 Oct. 1993
3-922602-18-5

Vol. 18
Information Superhighway :
The Role of Librarians, Information Scientists,
and Intermediaries
Festschrift in honor of Frederick Wilfrid Lancaster
17th International Essen Symposium
24 Oct. - 27 Oct. 1994
3-922602-19-3

Vol. 19
Impulse für Bibliotheken
Festschrift für Bernhard Adams zum 65. Geburtstag
3-922602-20-7

Vol. 20
Electronic Documents and Information :
From Preservation to Access
Festschrift in honor of Patricia Battin
18th International Essen Symposium
23 Oct. - 26 Oct. 1995
3-922602-21-5

Vol. 21
Towards a Worldwide Library : A Ten Year Forecast
19th International Essen Symposium
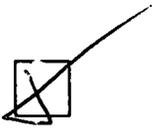23 Sept. - 26 Sept. 1996
3-922602-22-3

354