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CONTENTS

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Information Technocracy: Prologue to a Farce or a Tragedy

Carolyn M. Gray

A popular Government without popular information, or the means of acquiring it, is but a Prologue to a Farce or a Tragedy; or perhaps both. Knowledge will forever govern ignorance: And a people who mean to be their own Governors must arm themselves with the power which knowledge gives.
James Madison, letter to W. T. Barry in 1822.

Information technology is transforming American society, providing expanded opportunities, and presenting new challenges. Recognizing the significant challenges these technological innovations present to society and the library community, in 1983 the American Library Association created a Commission on Freedom and Equality of Access to Information. The commission was charged with the dual task of analyzing technological trends in the production and dissemination of information and of recommending policy development.[1]

Government information is among the eight major themes around which the commission's recommendations centered. The commission calls upon local, state, and federal governments to "raise library and information services to a much higher place on the societal agenda. Specifically because access to the full range of both print and electronic information technologies is so essential to effective participation in a modern democratic society and a free economy," librarians must assume an active political role to ensure that libraries are assigned a higher place on the societal agenda.[2]

Since the days of Madison and Jefferson, Americans have recognized freedom of information to be an essential component of the democratic process. Freedom of information implies that access to government information shall be both unrestricted and free of charge. For groups as diverse as environmentalists, scientists, librarians, labor unions, human-service advocates, and consumer rights organizations, as well as private citizens, freedom of information is relevant. A lack of concrete information may have adverse effects upon the ability of any such group to bring about change, to conduct research and accurately report findings, and to advise the public of potential danger, or good.

Information policy formulated to support the basic principles and values of American society can help us examine issues in relation to (1) the stewardship and control of resources upon which we are dependent; (2) the organization of work in society; (3) the exchange and distribution of the products of that work; and (4) the governance of decision making. Citizen involvement in the democratic process must be based on knowledge of the workings of the federal government. Information policies that ensure citizen access serve also to ensure that decisions and policies will not be left solely in the hands of bureaucrats and interest groups.

As the Commission on Freedom and Equality of Access to Information found, it is becoming increasingly difficult for citizens to gain access to government information. This paper (1) reviews some information technology trends that relate to

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collection, transfer, and dissemination of information and the subsequent implications for information policy; (2) examines the roles of government and both the public and private sectors in information policy formulation; and (3) draws some conclusions to suggest a broad course of action for citizen involvement in information policy formulation.

EMERGING PROBLEMS OF INFORMATION TECHNOLOGY

"As a result of information technology, man's power over his environment will increase greatly and his susceptibility to manipulation will rise proportionately."[3] As a nation, we are faced with important policy issues related to developments in information technology being implemented by the federal government. As librarians, we need to involve citizens in policy formulation relating to the collection, transfer, and dissemination of government-held information through public awareness campaigns and other educational programs. Issues involved include the right to privacy, the freedom of information, First Amendment rights, Fourteenth Amendment rights, and the provision of information by the government.

Some recent developments illustrate the importance of addressing these issues in relation to information policy formulation. The free flow of information about the workings of the American government is being restricted by three trends:

1. the privatization of public information;
2. the reduction in the number of government documents printed; and
3. the subversion of both the Freedom of Information and the Privacy Acts by government agencies.

The trend toward privatization of public information is the process whereby information gathered at the public's expense is sold to a private company, which in turn markets the information for its own profit. Access is thus limited to those who can pay. Citizen access to public information is a right that is being threatened by the very nature of the technology that has led to the "information explosion." The 1966 Freedom of Information Act (FOIA), as amended in 1974, clearly defines the right to access information collected at government expense. That right includes access to any document, file, or other record in the possession of an executive agency of the federal government (subject to nine specific exemptions).[4]

The following, taken from the March 1984 *Congressional Record*, illustrates the trend toward the privatization of public information. "The Patent and Trademark Office has signed agreements with private companies for the automation of agency records at no cost to the Government. One aspect of these agreements requires the agency to deny Freedom of Information Act requests for the records in automated form."[5] Another example of the privatization concerns the U.S. census. Unlike past practice, the 1980 census data is being held in the private sector, without comprehensive documents having been placed in the nation's depository libraries.

Another significant trend is the reduction in the number of documents put out by the Government Printing Office (GPO), documents that serve as important sources of information. According to the American Library Association's Washington office, one in every four government publications has been eliminated since President Reagan took office.[6] Though electronic technologies promise great opportunities, they carry with them the triple specters of monopoly control, invasion of privacy, and limitation of access to government-held information. Valuable public information services are being discontinued. Under the Reagan administration, information is being treated as an economic commodity.

Americans have always viewed information as having public value. One of the chief methods of insuring a free flow of information has been through a strong nationwide network of depository libraries dating back to the middle of the nineteenth century. Today there are more than 1,380 depository libraries, with at least one being located in each of the 435 congressional districts.

The federal depository library system requires that one copy of each unclassified document published by the executive, judicial, and legislative branches be placed in

each of the depository libraries. Depository libraries receiving government documents in printed form free of charge must grant free access to these materials. No provisions requiring free access are made for documents published in electronic form. Technological advances allow for electronic storage and retrieval of information, intensifying the complexity of information access for an open democratic society. Members of the library community have requested that the scope of the depository program be expanded to include access to electronic databases created by the government. Maintenance of "free" access to government information regardless of the format is the key issue. In response to pressure from librarians, professional associations, and individual citizens, Congress appointed an Ad Hoc Committee on Depository Library Access to Federal Automated Data Bases. The final report of that committee, published in 1984 and entitled *Provision of Federal Government Publications in Electronic Format to Depository Libraries*, presents a good overview of the issues, as well as providing specific recommendations.[7]

The other significant trend affecting access to information is the subversion of the Freedom Of Information Act by executive orders, directives of the Office of Management and Budget, and the curtailment of funds to federal agencies to support FOIA compliance requirements. Looking back over the twenty years since the FOIA was passed, we see that its implementation has gone awry. When hostile to a particular concept, an administration can subvert a law which promotes that concept. Not until 1966 did citizens win the statutory right of access to federal agency documents with the passage of the FOIA. (The FOIA passed with broad bipartisan congressional support.) However, agencies of the executive branch showed little regard for the bill either when it was enacted or during the seven years following passage. Congress expressed displeasure with the treatment of the FOIA by government agencies and moved to strengthen the bill in 1974.[8]

The 1974 amendments to the FOIA require agencies to furnish information either without charge or at a reduced rate when the agency determines waiver or reduction of the fee to be in the public interest. Research shows that federal agencies have unclear or nonexistent fee-waiver regulations, and in fact, that fee waivers are seldom granted. For example, when the National Farmers Union asked for a listing of payment-in-kind (PIK) participants and amounts of the PIK commodities each received, the union was met with a request from the U.S. Department of Agriculture for $2,284.87.[9]

Contributing to the trend of fewer government publications being accessible is the simple fact that fewer publications are being issued. The Paperwork Reduction Act places federal agencies under the directive from the Office of Management and Budget to reduce the number of publications.

Access to unclassified government information has decreased as well. In a 1984 series in the *Boston Globe*, Ralph Gelbspan found that, "the Reagan Administration, while denying it is pursuing any formal policy, has moved systematically over the last three years to restrict or cut off access to a wide range of traditionally public information."[10] Gelbspan cites three broad areas of concern: (1) the reclassification of previously open information as secret; (2) restrictions seeking to control communications by scientists under government contract; and (3) the noncompliance by federal agencies with Freedom of Information requests.[11]

Government agencies have gathered much information about individuals. The nature of the technologies being used makes monitoring more difficult and increases the danger for invasion of an individual's privacy. Burnham, writing in the *New York Times*, reports that, "the Reagan Administration has sharply reduced the number of Federal employees working to protect individuals from improper use of public and private records, according to a report by the Government Accounting Office."[12]

The privatization of public information, the reduction in printed government documents with a related limitation on access to electronic information, and the subversion of laws enacted to protect both access to public information and individual privacy

are trends that prompt this author to suggest the need for increased public involvement in information policy formulation.

PUBLIC POLICIES AND INFORMATION TECHNOLOGY: IMPLICATIONS AND CONSEQUENCES

The convergence of print media with the electronic media and computer technology is creating an environment that allows bureaucrats to limit the public's access to government-held information. There may no longer be printed documents for some types of information. With the installation of word-processing, text-editing, and electronic-photocomposition equipment in government agencies, the creation and storage of government documents is becoming electronic in nature.

We must have an understanding of information technology issues if we are to retard the forces that can prevent the maintenance of an environment where informed, timely debate about critical policy issues can take place. One of the issues of policy formulation is the traditional economic conflict between equity and efficiency. The stakes are high for companies in the information processing field. Information entrepreneurs stand to make a good deal of money in the purchase, repackaging, and sale of government information. In the development of information policy we must develop a strategy that balances equitable access with the need to encourage private sector investment in information technology.

With the convergence of print media, computer technology, and communications technology, information policy issues become critical to the maintenance of an informed, free democratic society. The three-way division of power in the federal government has provided a system of checks and balances; until recently, a network of safeguards had protected the collection, transfer, and dissemination of information in American society. Regulations differed because of the nature of the media and the development of technology. In the past, the print media, especially newspapers, were separated from the electronic communications media. Even with the emergence of broadcast journalism, there were still fundamental differences in the media and healthy competition among them. The limited spectrum for broadcasting dictated some forms of regulation. The Communications Act of 1934 established the Federal Communications Commission (FCC) that, in the public interest, was empowered to regulate interstate and foreign communication by wire and radio. The fundamental differences between printed sources and broadcast media have been blurring ever since the establishment of the first data communications network. Ithiel de Sola Pool expressed this convergence in the following manner:

> No longer can electronic communications be viewed as a special circumscribed case of a monopolistic and regulated communications medium which poses no danger to liberty because there still remains a large realm of unlimited freedom of expression in the print media. The issues that concern telecommunications are now becoming issues for all communications as they all become forms of electronic processing and transmission.[13]

The consequence of doing nothing about information policy formulation threatens the very fiber of the democratic process, because, "how information is handled in this country determines, to a large extent, the quality of the decisions which our people make."[14]

The Justice Department has estimated that the cost of administering freedom of information requests was $47.1 million in 1984. The administration has given this seemingly high cost as the reason for imposing severe budget cuts for FOIA administration. The question arises as to what taxpayers are willing to support to meet the public's request for information through the FOIA.

For good or ill, the fragmentation of information policy formulation strengthens the role of private industry. We must develop a mediated agreement between the varied private interests and the public welfare in the development of information policy. Rapidly changing technologies and the concomitant emergence of new economic interests serve to create a diversity of interests resulting in a fragmentary approach to the formulation of information policy.

To understand policy directions for the future it is helpful to examine some of the

information policies developed by the federal government in the past twenty years.

During the mid-sixties, issues of privacy relating to government-collected information came to the national attention with the *Griswold* v. *Connecticut* case. With that case, the Supreme Court began the process of developing a new legal definition of privacy. Nine years of Senate hearings, House hearings, and public debate regarding the invasion of privacy by government agencies ensued before the Privacy Act of 1974 was enacted. The development of computerized data banks by the federal government made potential abuses so threatening.

In 1966 the Freedom of Information Act was enacted under pressure for more open government. Amendments in 1974 clarified the scope of the act and the requirement for compliance by federal agencies.

The Paperwork Reduction Act of 1980 established the Office of Information and Regulatory Affairs and the Federal Information Locator System (FILS) within the Office of Management and Budget (OMB). FILS is intended to be used by federal agencies to determine whether data sought has already been collected. The act requires all agencies to have a senior-level official who coordinates information activities, including: (a) an inventory and review of information systems; (b) a check for duplication of functions within agencies; and (c) an impact assessment of the burden of paperwork for proposed legislation affecting the agency.[15]

A directive from the OMB, entitled *Improving Government Information Resources Management*, has as one of the stated objectives a review process to determine if federal information centers perform a necessary government function, duplicate a private-sector service or another government operation, and/or operate on a full cost-recovery basis. "The Paperwork Reduction Act has provided a framework through which information, broadly defined, is viewed as an economic resource to be managed effectively and efficiently."[16]

These are only a few examples that show the piecemeal approach to information policy formulation through laws, agency regulations, and directives.

The OMB review process is a policy that encourages, and even under certain economic conditions mandates, the privatization of public information. To eliminate duplication of services offered by the private sector, reviews have concentrated upon information centers of the Department of Education, the National Library of Medicine, and NASA and federal information centers of the Department of the Interior and the Department of Labor's Occupational Safety and Health Administration Technical Data Center. In 1982 alone, 26 federal agencies were targeted for the review process. No provision for free public access to the information once it has been transferred to a private sector provider is made.

Under the OMB review policy in 1985, the Securities and Exchange Commission (SEC) issued a request for proposal for a pilot test of an electronic filing, processing, and dissemination system. The SEC is seeking a system to handle the multiple disclosure forms that publicly held companies are required by law to file. These forms represent some of the most heavily used information collected by the government at public expense. The SEC has said that the company chosen to run the system will be required to make a certain amount of basic information available at low cost.[17] As in the case of the Patent and Trademark Office, there is no assurance of reasonable access to the forms by individual citizens or public interest organizations.

THE ROLE OF GOVERNMENT AND CITIZENS

No legislative action has tied together the laws and regulations regarding the print, communications, and electronic media. The only indication by Congress of a need for coordination of issues regarding information policies that have been developed occurred ten years ago with Senate Bill 3076, introduced on March 4, 1976, which would have required that all reports accompanying proposed legislation include an information impact statement; the bill was never passed.

Public laws continue to bring into existence commissions that relate to specific aspects of information policy. Laws have covered privacy, wiretapping, electronic funds transfer, federal paperwork, and the

records and documents of federal officials. The executive branch has responded in much the same way as Congress when faced with information policy issues. Our government does not seem equipped to meet the immediate pressures generated by technology and citizen demands.

Broad input into the policy-making process is desirable. "Our challenge is to ensure that the changes in society, caused by changes in technology, are consistent with the principles that have framed our society for the last two centuries."[18] Librarians, along with citizen groups, should take the lead by informing the public of the problems and offering constructive solutions to the legislature. State groups should develop model information policy programs, which may in turn be adopted by other states, for the new technologies affect more than just federal information. These model state programs could serve to put information policy formulation on the national agenda.

Taking into account the pluralistic nature of our political process, we must frame an agenda with two very broad policy categories: (1) the legal foundation of information dissemination and access and (2) the economics and management of information. An independent commission should be established to coordinate activities, work with Congress to create the necessary legal foundation, and work with the private sector to resolve conflicts arising from competing interests. The National Commission on Library and Information Science (NCLIS), an independent agency that advises the executive and legislative branches of government on policy, though having a more narrow focus, has served some of the functions being proposed. At this writing, the commission has an uncertain future because of federal funding cuts. Given adequate funding and support, NCLIS could be charged with the coordinating role of establishing a national information policy agenda.

Congress must readdress itself to the issues of collection, transfer, and dissemination of information to ensure a comprehensive legislative approach. A broad information policy agenda is proposed in the Rockefeller Report, which calls for the

1. formulation of information collection policies to balance governmental needs against economic, political and social costs;
2. establishment of principles that promote efficiency and provide adequate safeguards for the intragovernmental transfer of information; and
3. continuance of progress toward a more rational disclosure policy.[19]

Actions by the executive branch are shaping national information policy without any rational plan or public input.

> Despite the advances in consumer rights practices in recent years, decisions on the consumption of communications and information still tend to be the exclusive province of the bureaucracies—public and private—involved. At a time when we need to take actions to strengthen communications and information patterns in this country through the end of the century, an important element in the decision process is often missing—the views of the individual consumers.[20]

The complementary nature of government and the private sector can exist only through a spirit of cooperation that will lead to the achievement of the overall objectives of an open information society. Dizard proposes an information grid that will deal with public needs, available technology, and economic resources. The information grid gives the private sector responsibility for the development of technology in a competitive market. Society develops a set of social goals to establish information technology needs. The public sector's role is limited to providing fiscal incentives for applications of technology to meet the social goals that could not otherwise be met on economic grounds. Within this construct, the public sector must also assure the availability of communication and information services. This cannot be provided equitably in a competitive marketplace without the establishment of an information elite.[21]

As librarians, we must perfect our political and technological skills, so we may fully participate in the ongoing debates and help frame a rational information policy agenda to insure that citizens and politicians understand the importance of these issues for the maintenance of an open democratic society. Careful study of the recommendations of the Commission on Freedom and Equality of Access to Information coupled with an action-oriented response by the library profession is a constructive place to begin to frame such an agenda.

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Implications of Current Reference Structures for Authority Work in Online Environments

Mark R. Watson and Arlene G. Taylor

This study undertook, first, to determine the percentage of personal and corporate name authority records in the Library of Congress authority file that do not contain any references. Second, by means of a categorization, tabulation, and analysis process, the study also attempted to identify the percentage of references present on existing authority records that are not needed in an automatic right-hand truncation and keyword searching environment. The results provide an indicator of all the authority records in the Library of Congress authority file that would not have had to be created manually, or even created at all, in a system that provided other means for authority control. These results should provide helpful information to libraries preparing for conversion from manual to automated authority control and should aid automation planners in selecting technologies that provide more than the automation of manual practices—those harnessing the formidable powers of the computer in order to facilitate the process of automated authority control.

In the last ten years, much discussion has been devoted to the topic of authority control and its value in the context of online catalogs. Arguments for and against the elimination of authority control in an automated environment have been proposed.[1] At the close of a decade of discussion, it appears the former group of advocates have successfully ensured the future of at least the part of authority control that makes certain all manifestations of a name will be brought together under one form. Once a user finds that form he or she can feel confident everything relating to that person or body will be found under that name or that he or she will be told where to find other related material.

This study, therefore, began with the assumption that an authority file that collocates the usages and variants of a name under one form is an absolutely essential component of an online catalog. Put another way, authority control—"the process of maintaining consistency in headings in a bibliographic file through reference to an authority file"—was seen to be of paramount importance in both the design and operation of any online system.[2] What was of interest, then, given this commitment that the "process of maintaining consistency" should in no way be compromised, was authority work—"the process of determining the form of a name, title, or subject concept that will be used as a heading on a bibliographic record; determining references needed to that form; and determining relationships of this heading to other authoritative headings"—and how it should be accomplished in an online environment.[3] Given certain types of file structures and search-processing functions, much of the authority work currently being done in

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the name of authority control is unnecessary in an automated catalog and could be streamlined both in terms of the kinds of references being made to headings on authority records and the kinds of authority records being created. However, and this must be stressed at the outset, optimizing both the capabilities of the computer and the time of the cataloger by eliminating unnecessary parts of authority *work* (i.e., by creating only necessary references and records) does not violate the integrity of authority *control*, and it is hoped that the findings of this study will show this to be true.

The following is a discussion of a project that set out to confirm and extend the results of previous research that could have a significant impact on the "how" of automated authority control—research that indicates that perhaps "adequate authority control can be achieved without creating an elaborate MARC format authority record with all its fixed fields, subfields, etc., for every name."[4]

CONTEXT

In the process of investigating how useful linked authority records would be in assisting users who perform searches in an online catalog for particular authors by keying in names not chosen by the cataloger, Taylor discovered that 57.5% of the 240 personal name authority records she searched and found in the Library of Congress authority file contained no references.[5] Furthermore, she discovered that 14.6% of the authorities contained only references that varied from the established heading in forename fullness—references that would be unnecessary in a system with automatic right-hand truncation.

In another study that compared *see* references for personal and corporate names in a manual and an online authority file and evaluated the differences "vis-a-vis the power of the online keyword search," Thomas discovered that "nearly one-half of the cross-references required in manual files could be dispensed with in MELVYL's online keyword search environment."[6] Given "search processing functions such as keyword indexing and automatic right-hand truncation," references made to headings from word-order inversions and less full forms of the established name were shown to be unnecessary.[7]

The discovery of such a large number of authority records without references, together with so many unnecessary references raises some serious questions about the way authority *control* is being achieved through the authority *work* currently being carried out. The prevailing practice of creating an authority record for every name in the catalog may need to be reconsidered, especially in light of new developments in integrated systems technology that do not require the creating of an authority for a heading needing no references and that offer powerful searching capabilities, rendering many references now being made unnecessary.[8] These systems hold out the possibility of saving a great deal of the time and money now spent on authority work by not only reducing the number of references required for names needing authority records, but also by eliminating the need to create authority records at all for those names needing no references. In fact the savings could be quite substantial: Taylor's research has shown that two-thirds of all the headings in the name/title portion of the catalog are for personal names,[9] and her research cited earlier showed that more than 50% of the personal name authority records could be dispensed with in a system where the creation of an authority record was not mandatory.

PURPOSE

In light of the possibilities held out by new system technologies for achieving authority control without creating unnecessary references and authority records, this study undertook, first, to determine the percentage of personal name authority records (henceforth referred to as PNARs) and corporate name authority records (henceforth referred to as CNARs) in the LC authority file that did not contain any references. The objective of this part of the investigation was to validate Taylor's findings with regard to PNARs without references—findings that could not be considered statistically significant because the authority records examined did not represent a random sample of authorities from the LC file. Second, by means of an analy-

sis, categorization, and tabulation process, the study also attempted to identify the percentage of references present on existing authority records that would not be necessary in an automatic right-hand truncation and keyword searching environment. The objective here was to compare results with those obtained by Thomas, who looked at both personal and corporate *see* references, assessing their usefulness in the searching environment of MELVYL—a system featuring both of the sophisticated search functions used in this study as benchmark criteria for whether or not a reference was necessary. Finally, this study sought to extend both Taylor's and Thomas' research by broadening the investigation of authorities lacking references to include CNARs and by determining how many of the authorities with references contained only those found to be unnecessary.

METHODOLOGY

To perform this study a concerted effort was made to draw a random, bias-free sample of PNARs and CNARs from the LC online authority file. For the purposes of this study, PNARs refer only to those authority records established for names coded 100, excluding name/title authorities. Name/title records were excluded because they would have biased the sample in favor of those authors whose works have been translated into different languages and those whose works often appear as name/title related works or analytical added entries. CNARs refer only to those authority records established for names coded 110 (names of corporate bodies that are not conferences, meetings, etc.) and 111 (names of conferences, meetings, etc.). Geographic names (151s) and series and uniform title authorities (130s) were not included but should be the subject of a future study.

For this study, a precision of 5% with a confidence level of 95% was desired. Because the earlier study had shown the percentage of records without references to be near 50%, it was important to select a sample large enough to guarantee that if the sample proportion was indeed close to .5, then it was not so simply as a result of chance. The formula for calculating the binomial proportion confidence interval was used to determine the sample size by solving for n, as p, q, and the desired error were known:[10]

$$(1.96)\sqrt{p \times q/n} = E$$

Here p is the proportion found in the sample to lack references (.5), q is the proportion not having the characteristic represented by p (.5), n is the number of items in the sample, 1.96 is the constant needed for a 95% confidence level, and E represents the desired error of .05. In order for the formula to yield a desired error of 5% when the sample proportion p is estimated at .5, n must be equal to 384.16. In other words, a sample of 400 PNARs and 400 CNARs would keep the desired error under 5% and provide enough records to produce statistically significant results.

Records were drawn using random numbers. Each record drawn was examined in order to make sure that the heading was either coded 100 (and did not include a title field), 110, or 111 and that it had been established according to the provisions of AACR2. (AACR2 records were desired for this study as it was thought that most online catalogs—in stark contrast to most card catalogs—in operation now and in the future would contain predominantly AACR2 records.) Furthermore, the authority record was scrutinized to make sure it did not bear the legend "Early Notice Record"—a type of in-process authority that, while containing an AACR2 heading, lacked references that might or might not have been added later Records not meeting the requirements were dropped from the sample. The required number of PNARs was arrived at relatively quickly when compared to the time necessary to pull up 400 AACR2 CNARs. Because they make up a much smaller proportion of the total number of authority records in the authority file, the CNARs were more difficult to find.

While "Early Notice Records" were excluded, PNARs and CNARs with unevaluated references were included. Unevaluated references are those that have not yet been scrutinized by a cataloger at LC to determine whether they meet AACR2 policy guidelines for references. They are the legacy of a project that occurred during the

early days of the online authority file when paper authority records were input verbatim into the database, except for the fact that most headings were upgraded to conform with AACR2. These references were evaluated by applying the appropriate cataloging rules and LC Rule Interpretations. A total of 163 references on 22 PNARs and 57 CNARs required evaluation.

FINDINGS

The 400 PNARs and 400 CNARs were first separated into groups that contained no references versus those that contained references. It was found that 273, or 68.3%, of the PNARs and 102, or 25.5%, of the CNARs contained no references.

As has been stated, the CNARs in the sample contained a mixture of headings coded 100 and 111. There were 360 occurrences of 110 authority records, of which 97 (26.9%) contained no references, and 40 occurrences of 111 authority records, of which 5 (12.5%) contained no references.

References on records that contained references were analyzed using tally sheets developed for this purpose. There were a total of 207 references on 127 PNARs and 630 references on 298 CNARs. Tables 1 and 2 show the numbers of PNAR and CNAR references found in each of the various tally-sheet categories.

Examples are perhaps the best way to explain the categories used:

PERSONAL NAMES

Surname different:
heading: Franco, Matilde de Sousa.
reference: De Sousa Franco, Matilde

Surname same/forename different:
heading: Bogaert, Dré, 1920–
reference: Bogaert, André, 1920–
also included here were references that were *more* full than the heading:
heading: Osborn, Fairfield, 1887–1969.
reference: Osborn, Henry Fairfield, 1887–1969

Forename fullness different:
heading: Wedd, A. F. (Annie F.)
reference: Wedd, Annie F.
heading: Balescu, Radu.
reference: Balescu, R.

Forename different:
heading: Dunn, Mary Borromeo.
reference: Borromeo, Sister
reference: Mary Borromeo, Sister

CORPORATE NAMES

First word different:
heading: OWCP Longshore Task Force (U.S.)
reference: United States. Employment Standards Administration. Office of Workers' Compensation Programs. OWCP Longshore Task Force

Fullness/variant:
heading: Hudson Research Services.
reference: Hudson Institute. Hudson Research Services

Abbreviation:
heading: Mexico. Subsecretaria Forestal y de la Fauna.

Table 1. Total Number of PNAR References in Each of the Tally Sheet Categories.

Type of reference	Number	Percent
Surname differences	82	39.6
Surname same/Forename different	44	21.3
Forename fullness	43	20.8
Forename differences	33	15.9
Do not make references	5	2.4
Total	207	100.0

Table 2. Total Number of CNAR References in Each of the Tally Sheet Categories.

Type of reference	Number	Percent
First word different	204	32.4
Fullness/Variant	172	27.3
Abbreviation	81	12.9
Do not make references	63	10.0
Inversion from government subheading	32	5.0
Inversion from subject word	24	3.8
Punctuation only	23	3.7
Inversion from conference term	18	2.9
Minor change in spelling	9	1.4
Inversion from sponsor	4	.6
Total	630	100.0

reference: SFF
reference: S.F.F.

Inversion from government subheading:
heading: Montana. Governor's Ground Water Advisory Council.
reference: Montana. Ground Water Advisory Council, Governor's

Inversion from subject word:
heading: Conference on Liquid Scintillation Counting (1957:Northwestern University)
reference: Liquid Scintillation Counting, Conference on

Punctuation only:
heading: ASCD 1982 Yearbook Committee.
reference: A.S.C.D. 1982 Yearbook Committee
heading: University of Louisville. Choir.
reference: University of Louisville Choir

Inversion from conference term:
heading: IFIP-IMIA WG 4 Working Conference on Data Protection in Health Information Systems (1982) : Kiel, Germany)
reference: Conference on Data Protection in Health Information Systems, IFIP-IMIA WG 4 Working

Minor change in spelling:
heading: Gujarat (India). Directorate of Employment & Training.
reference: Gujarat (India). Directorate of Employment and Training

Inversion from sponsor:
heading: NATO Advanced Research Institute on Microbial Metabolism and the Cycling of Organic Matter in the Sea (1981 : Cascais, Portugal)
reference: Advanced Research Institute on Microbial Metabolism and the Cycling of Organic Matter in the Sea, NATO

Do not make references in both categories were references coded in the "subfield w" as references that should not be made in the catalogs at the Library of Congress. These were usually the name in the form used as heading under pre-AACR2 rules.

When categories of references were separated by whether they appeared on records coded 110 or records coded 111, it was discovered that 64.9% of references on 110 records fell in either the "first word different" or fullness/variant categories, while only 22.1% of the references on 111 records fell in these categories. On the other hand, 59.7% of the references on 111 records were the result of inversion of terms from the heading, while only 5.8% of the references on 110 records were the result of inversion. Overall, it is reasonable to say that the reference structures on 111s were less complex than those on the 110s, and because the majority of the references on 111s were often identical to the heading except for word order, the references themselves—together with a great many of the 111 authority records on which they appear—could easily be eliminated with no loss of retrieval in an online system such as MELVYL, which features keyword searching.

The next part of the analysis undertook to identify categories of references that would be unnecessary in an online system featuring sophisticated search-processing functions such as automatic right-hand truncation and keyword searching, coupled with the ability to strip out embedded punctuation. To aid in assessing and isolating certain types of unnecessary references and to eliminate misunderstandings about how these search-processing functions were operative and being applied in an abstract system, a decision was made to perform this part of the analysis with a specific automated environment in mind—one that did, in fact, use the searching functions mentioned above, and also one that might already be familiar to the readers of this study, or at least one whose search-processing capabilities had been previously documented. The system chosen was "the production version of MELVYL, the University of California's systemwide online catalog."[11] In addition to providing a basis in reality upon which to make judgments about the usefulness of various types of references, the decision to use MELVYL also provided an opportunity to compare the results of this part of the investigation with those obtained by Thomas in the study mentioned earlier.

Each *see* reference found on the 127 PNARs and on the 298 CNARs containing references was evaluated as to its necessity in a system like MELVYL that provides keyword access to both personal and corporate names, using automatic right-hand truncation and a normalization process that removes embedded punctuation appearing in acronyms and initialisms. Tables 3 and 4 present the result of this analysis. It was found that 86 of the 207 personal name references would be unnecessary us-

ing our criteria. Of these, 23 were on records that also contained references that were considered necessary. The remaining 63 appeared on 58 records for which these were the only references. This means that 14.5% of the PNARs contained only unneeded references and that 16.0% of the references on the remaining PNARs were unnecessary. Of the 630 corporate name references, 138 were found to be unnecessary. Of these, 89 were on records that also contained references that were considered necessary. The remaining 49 appeared on 34 records for which they were the only references. This means that 8.5% of the CNARs contained only unneeded references and that 15.3% of the references on the remaining CNARs were unnecessary.

The categories for the references considered to be unnecessary did not all correspond exactly with the types of references identified in tables 1 and 2. Word order inversions for personal names were extracted from the "surname different" and "forename different" categories, e.g.:

heading: Pennacchiotti Monti, Irma.
reference: Monti, Irma Pennacchiotti

heading: Fawzi, Jamal.
reference: Jamal Fawzi

For corporate names this category included references that differed in word order, differed from the inversions counted in the other categories, and most often came from the "first word different" category, e.g.:

heading: Experimental Pilot Project Integrating Education in Rural Development (Pakistan)
reference: Pakistan. Experimental Pilot Project Integrating Education in Rural Development

Less full was used in this study as a descriptive term applied to any reference that was made to a heading containing the name in a fuller form. In other words, the heading in question not only contained all the name elements and information provided in the reference but more as well. However, references of this type were only numbered in this category if they did not fit into any of the other unnecessary categories. Therefore, on PNARs, only one reference fit this description:

heading: W. R. (Walter Rumsey), 1584–1660.
reference: Rumsey, Walter, 1584–1660

Less full references were more numerous for corporate names, e.g.:

Table 3. Unnecessary References on PNARS.

Categories	Number of unnecessary references	Percent of total references	Number PNARs with only unnecessary references	Percent of total PNARs
Forename fullness	43	20.8	33	8.3
Word order	42	20.3	25	6.3
Less full	1	.5	0	0
Total	86	41.5	58	14.5

Table 4. Unnecessary References on CNARs.

Categories	Number of unnecessary references	Percent of total references	Number CNARs with only unnecessary references	Percent of total CNARs
Inversion from government subheading	32	5.1	5	1.3
Inversion from subject word	24	3.8	9	2.3
Less full references	24	3.8	5	1.3
Punctuation only	18	2.9	1	.3
Inversion from conference term	18	2.9	1	.3
Word order	13	2.1	0	0
Period after entry term removed	5	.8	2	.5
Inversion from sponsor	4	.6	0	0
Combination of above			11	2.8
Total	138	21.9	34	8.5

heading: South Carolina Land Resources Conservation Commission
reference: South Carolina Land Resources Commission

It should be pointed out that LC is no longer making references that consist of inversions from the subject words of conference headings. Over time, the relative proportion of these types of references to others in the database will grow smaller and smaller. Many of the new CNARs that would formerly have had such references will join the group of CNARs that contain no references at all.

Do not make references were included among those considered necessary because, upon investigation, it was discovered that 65.1% of these references contained words, places, dates, etc., that were not included in the heading. Eliminating these references could, in many cases, sacrifice an important way of getting to the AACR2 heading, especially as the *do not makes* often contain the AACR1 form of the heading that a patron might happen to know. Actually, the label *do not make* is somewhat of a misnomer, because it applies to procedures for the creation of references in a manual catalog, whereas in an online system the reference is available for searching like any other.

A comparison with Thomas' results reveals some differences. Where Thomas found 44% of the corporate *see* references to be unnecessary, this study found only 21.9% to be unnecessary. One possible explanation for the discrepancies might be the difference in sample sizes. Whereas Thomas examined 116 corporate *see* references, this study examined 630. Of the 630 references, only 77, or 12.2%, were found on records for 111 headings. Thomas does not indicate how many of the 116 references were made from 411s, but it is possible that her figures for unnecessary references on CNARs were higher due to a high proportion of 411 references in her sample. It is probable that Thomas' sample contained no *do not make* references, because her sample was drawn randomly from the actual references made in a manual authority file. Her results for unnecessary *see* references on PNARs correlated more closely with those obtained in this study: Thomas' 48% compared with this study's 41.5%.

Table 5 presents the study's findings with regard to *see also* references found on the authority records in the sample that contained references. None of the *see also* references was evaluated for its usefulness in an online system such as MELVYL, because each such reference was seen as providing a unique access point to the established heading. Each 500, 510, and 511 reference is also a heading on a name authority record of its own, and its presence on the name authority record for an earlier, later, or related heading plays an important role in the syndetic structure of the online catalog.

Table 6 provides a comparison of the total number of 4xx and 5xx references found on both the PNARs and CNARs in the sample. The table reveals a preponderance of 4xx references on both the PNARs and CNARs in the sample.

Table 7 divides the PNARs and CNARs that did not contain any references into two categories: records that contained information about the heading not already reflected in the heading itself and records that provided no additional information about the heading. Given, in the context of this study, that these records were marked as expendable, the idea here was to determine just how many of these authority records

Table 5. See Also *References Found on Authority Records.*

See also references	PNARs	CNARs	CNARs with only 5XXs
510s	0	71	9
550s	0	37	4
551s	0	9	0
511s	0	1	0
500s	2	0	0
Combination	—	—	1
Total	2	118	14

contained information that, although of no help to the online searcher, could aid a cataloger in distinguishing the name in the heading from another that was identical in form but ambiguous in substance. As can be seen from table 7, 47.6% of the 273 PNARs in the sample without references (or 32.5% of the total number of PNARs in the sample) contained additional information not reflected in the headings. It can also be seen that 37.3% of the 102 CNARs without references (or 9.5% of the total number of CNARs in the sample) contained information about the heading that was not already provided in the heading itself. For personal names, source citations often included additional dates, degrees earned, occupations held, places of employment, honorary titles, etc. On many of the records, the title and imprint date of the work from which the name was being established provided clues about the name that might help to distinguish it from another identical in form. (This information, however, could be gotten from the bibliographic file, if needed.) For corporate names, source citations included place names, dates, and the names of higher bodies with which the corporate body was associated. It is evident that CNARs without references are less likely to contain additional information than are PNARs without references.

The question of whether additional information that might aid the cataloger is sufficient reason to warrant the creation of an authority record needs to be researched. Perhaps the most difficult and frustrating part of doing authority work is having to make a judgment about whether the name in hand represents a person or corporate body new to the catalog or one already established with an identical name when the evidence upon which to base that judgment is unclear or simply unavailable. In those instances, any help or extra information is most welcome. But it is necessary to ask How often does the worst-case scenario occur? In other words, How often will an examination of the headings in the authority file, along with the bibliographic records associated with those headings, lead to a complete dead end? How many times does a cataloger confront the problem of two authors writing on similar topics, around approximately the same time, using the same or similar forms of name? Perhaps this does not happen often enough to justify making authorities when some extra tidbit of information could be supplied in addition to the heading. On the other hand, maybe the presence of a place of employment or degree received has bailed out catalogers time and again. More research needs to be done in this area in order to shed light on the pros and cons of using authority records as storage areas for information about a person,

Table 6. Proportions of See *and* See Also *References.*

Type of reference	Number on PNARs	Percent of total PNAR references	Number on CNARs	Percent of total CNAR references
4xx	207	99.0	630	84.2
5xx	2	1.0	118	15.8
Total	209	100.0	748	100.0

Table 7. Information about Names Not Contained in Headings or References.

	PNARs			CNARs		
	Number	Percent without references	Percent of total PNARs	Number	Percent without references	Percent of total CNARS
With additional information in records	130	47.6	32.5	38	37.3	9.5
Without additional information in records	143	52.4	35.8	64	62.7	16.0
Total	273	100.0	68.3	102	100.0	25.5

body, or form of name.

SUMMARY

The purposes of this study were first to determine the percentage of PNARs and CNARs in the LC authority file that did not contain any references and second to identify the percentage of references present on existing authority records that were not necessary given an online system with keyword and automatic right-hand truncation searching capabilities. The ultimate goal was to determine how many of the personal and corporate name authorities in the LC authority file would not be needed, or at least would not have to be created manually in the context of an online environment with keyword and automatic right-hand truncation searching capabilities.

It was found with a confidence level of 95% that 68.3% (plus or minus 4.6%) of the records for personal names in the LC authority file contain no references. Of the remaining 31.8% that contain references, 45.7% (or 14.5% of the total number of PNARs in the file) contain only unnecessary references consisting of variations from the heading in forename fullness, word order inversions, or references less full than the heading. Adding the two together (i.e., the 68.3% with no references and the 14.5% containing only unneeded references) produces the statistic that 82.8% (plus or minus 3.7%) of the PNARs in the file are unnecessary and could be eliminated with no loss of retrieval in a system that offers an alternative to creating an authority record for every personal name and features keyword and automatic right-hand truncation for personal name searches. Furthermore, on the remaining 17.3% of necessary PNARs in the file, it was found that 16% of the existing references are also unnecessary.

The results from the analysis of the records for corporate names showed that 25.5% (plus or minus 4.3%) of the authorities in the file contain no references. Of the remaining 74.5% that contain references, 11.4% (or 8.5% of the total number of CNARs in the file) contain only unnecessary references consisting of variations from the heading in punctuation, word order inversions, or references less full than the heading. Adding the two together (i.e., the 25.5% with no references and the 8.5% containing only unneeded references) produces the statistic that 34% (plus or minus 4.6%) of the CNARs in the file are unnecessary and could be eliminated given an online system similar to the one mentioned in the previous paragraph. Finally, on the remaining 66% of the necessary CNARs in the file, 15.3% of the existing references were found to be unnecessary.

LC authority file statistics, as of June 1985, show PNARs accounting for 69% of the 1,329,261 records then in the file.[12] Therefore, if 69% of the records in the authority file are for personal names, and 82.8% of those records are unnecessary, then 57.1% of all the authority records in the file would not have had to be created manually, or created at all, in a system that provided other means for authority control. Moreover, because LC's statistics show CNARs (110s and 111s) accounting for 22% of the total records in the file, and the study has shown that 34% of those records are unnecessary, an additional 7.5% can be added to the 57.1%.

The results of this study, then, indicate that approximately 64.6% (plus or minus 4.7%) of the entire name authority file would not have to be created in an online environment where keyword and automatic right-hand truncation searching capabilities are combined with computer file structures that do not require making an authority record for names not needing references.

CONCLUSION

Dramatic results like these tend to provoke strong reactions. Mention the annihilation of 65% of the authority file and the destruction of 30% of the references remaining on the authorities that have been graciously granted a stay of execution, and librarians either hail a time savior or denounce a raving radical. To many, such drastic action must signal an erosion of the importance of authority control and the introduction of chaos into its practice. The fear is not valid. Authority *control* continues to be the cornerstone of the catalog—manual or automated. However, these results certainly point to the fact that the practice of authority *work* needs to un-

dergo some changes. First of all, it makes little sense simply to automate manual practice rather than to take a close look at the capabilities of the computer and develop an automated practice that takes full advantage of them. To fail to realize the power and enhanced retrieval of sophisticated search processing functions and, even worse, fail to incorporate them into the design of automated catalogs is to perpetuate inefficiency and create online public access catalogs in the image of their paper forebears. Second, linking records that provide no access to established headings in addition to the access already provided by the headings themselves is clearly a waste of time and money. Finally, it is clear that in planning for and implementing online authority control systems, priority should be given to designing ways of avoiding the creation of a name authority record for every personal and corporate name in the online catalog. Technology that provides flexibility in this area is already available and is worthy of serious consideration. In fact, the results of this study would seem to indicate that "serious consideration" is an understatement.

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Testing Bibliographic Displays for Online Catalogs

Walt Crawford

Displays for online catalogs should be understandable and attractive but should also be compact, presenting needed information on a single screen. No means of testing the overall results of display decisions has been available. RLG developed a means of testing displays against several hundred thousand records at a reasonable cost and used that means to test several dozen different display possibilities. The test methods and resulting publication should offer some guidance for future bibliographic displays.

An online catalog design involves hundreds of elements, and almost every element offers more than one option. Surprisingly few design elements show universal agreement among catalog designers. Good arguments can be made for different decisions at any point.

Most such design decisions are made in a vacuum. Designers have the tradition of card catalogs and may choose to base online design on those traditions or deliberately reject them. Recent designers have a brief history of online catalogs to look back on, but that history shows extremely wide variations. Designers have very little hard evidence as to what will work best. Joseph Matthews has summarized some findings,[1] but most of his sources do not relate directly to public use of library records, and the findings only slightly narrow the range of possible designs.

Almost every online catalog is considered successful. User surveys may not be sufficient to determine which catalogs are more successful than others and what factors make online catalogs successful. We need research projects that pay attention to specific aspects of catalog design in order to add a context for design decisions. Most libraries and vendors are not in a position to mount large-scale controlled experiments focusing on particular aspects of catalog design. Such experiments within an operating environment would be costly, take months or years to achieve proper results, and present catalog users with annoying shifts in context as different experiments begin and end. Fortunately, some aspects of online catalog design can be tested in an offline, batch environment. This paper discusses one such offline research project in some detail.

BACKGROUND

The Research Libraries Group (RLG) is a consortium of universities and independent research institutions involved in a number of cooperative programs. The Research Libraries Information Network (RLIN) is the computer hardware, software, and database supporting the ventures of RLG. Previous articles in *Information Technology and Libraries* have discussed some aspects of RLIN, including projects with implications for supporting online catalogs.[2]

The online component of RLIN can be compared to a very large online catalog and offers some insights into the problems of searching advanced online catalogs, but RLIN is not intended as a public access system. Bibliographic displays in RLIN are

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designed to serve the needs of technical processing and, to a lesser extent, reference. RLIN is normally used by library staff with some knowledge of catalog cards and USMARC. RLIN messages and prompting are terse, and relatively little online help is available. RLIN does not provide a complete model for bibliographic displays or for online catalogs.

The Patron Access Project

RLG is concerned with public access catalogs. In 1984, the J. Paul Getty Trust funded a two-year RLG project with a number of aims. One portion of the overall project was the Patron Access project. The goal of that project was to develop a design for a workstation-based patron access system to work with an online catalog based on RLIN software.

The first phase of the Patron Access project was a study of the literature of online access, leading to an outline of issues for online catalogs. While preparing that outline, I became aware that few of the issues were informed by research results or other hard evidence. No single study can address all the issues, and no single institution has the resources to carry out focused research on every issue. That makes it more important that each institution take advantage of its own special resources—not to provide final answers, but to provide better information.

The Lakeway Conference

The Council on Library Resources (CLR) sponsored and coordinated the most significant study of online catalog use, a study that provided only a beginning for further research. CLR also sponsored a series of conferences on various aspects of online catalogs, including a conference on online catalog screen displays held at the Lakeway Conference Center near Austin, Texas, on March 10–13, 1985. The conference included an "online catalog fair" presenting more than twenty systems split into two groups, each group available for some two hours of demonstrations. While the number of people and time available prevented deep exploration of any system, the sessions allowed the conferees to get a feeling for the range of user interfaces currently available; that feeling was enhanced by Joe Matthews' many examples during his presentation (see reference 1).

Several conferees noted the need for more research in a variety of areas. Speakers and conferees offered many suggestions for better displays, but few of those attending were willing to claim that they knew enough to establish an ideal display. The conference itself definitely resulted in improved displays for some systems, but also made most of us aware that much more research will be needed. I came away from Lakeway feeling that RLG should add some new contribution to its earlier involvement in the CLR study. To the extent that RLG and RLIN offer capabilities not readily available elsewhere, we should find some way to exploit those capabilities to increase the body of knowledge about online catalog possibilities.

Narrowing the Problem

One key decision in planning a research project was that it would be a limited project, one that could be done without grant funding. That meant narrowing the scope of research; it also meant finding cost-effective ways to carry out the research. The goal was to produce useful results rapidly and at low cost.[3] A specific project was designed based on existing RLG capabilities, known gaps in the literature, and the need to serve RLG's current and future needs while serving the wider library community.

During Lakeway, I found myself concerned with the overall results of certain display decisions, particularly those decisions affecting single record displays. Assuming that the last step for most users of online catalogs is the display of one or more individual records (prior to going to the shelves), how well would specific displays work?

The question of how well a display works is a complex one that can't be fully answered except over months of use of a real online system. However, some elements of the question can be answered in the absence of a real online system. Those elements form the basis for the Bibliographic Display Testbed project and are discussed briefly below.

Appearance

The first question for any bibliographic display is How does it look? That question breaks down further:

- Does the overall screen design clarify where the patron is, how he or she got there, where he or she can go next, and what information is actually being presented?
- Does the bibliographic display make sense? Are enough elements presented in such a way that patrons are likely to get the information they need?
- Is the display legible? Are there too many characters on the screen, or are the elements on the screen badly spaced? Is the display lacking in variety, or does it have so much variety that it is hard to look at?
- If there are labels, are the labels sensible? Are they easy to relate to the bibliographic information? Can they be ignored when not needed? Are they correct?

These questions involve professional judgment more than measurement. The project offered a way to prepare sample screens for bibliographic displays, printed so that a wide range of librarians and other RLG staff could evaluate and comment on them.

Effectiveness

The second question this project tried to answer is How effective is the display? That's a difficult question to define. Questions addressed in this project include:

- Does the display include all the information that patrons might be able to use?
- How often does all the information for a record fit on a single screen?
- How much of the display area is needed for the information?

The first question is not easily answered, but the second and third questions can be answered by statistical measures. For any given display design, large-scale tests can determine the percentage of bibliographic records that can be displayed entirely on a single screen and the average density of the display area.

How Much Data

The first set of decisions for any specific display is what data to include. Assuming that an online patron access system supports more than one display, the decisions will differ for each display—and a fundamental decision may be how many different displays to offer. For this project, data decisions needed to be as flexible as possible; this argued for a table-driven facility, designed so that changes in data would require no more than a few minutes' work.

Some research exists as to the data elements needed to complete a search, and some research suggests which data elements are most widely used by patrons. None of that research establishes a single answer as to what data can be useful and when too much data actually obstructs effective catalog use.

How Arranged

Display arrangement involves several factors:

- Overall screen layout—how many sections and what appears in each section;
- Order of data elements, spacing between elements, spacing above and below the bibliographic display, and margins on either side of the display;
- Use and arrangement of labels;
- Paragraphing of fields or providing of a new line for each field; indentation for additional lines within a paragraph or field; punctuation between and after data elements; and
- Highlighting of elements or labels.

As with inclusion of data elements, it seemed best to make display arrangement table-driven so that changes could be made as quickly and easily as possible.

REQUIREMENTS FOR THE STUDY

While questions of appearance can only be answered by professional judgment and, possibly, user surveys, questions of space requirements can be answered statistically. For those answers to have any validity, a study must meet certain requirements.

When attempting to compare the appearance of two different displays, a study must use the same bibliographic information. Specifically, display samples should use the same records so that the displays can be compared directly. Large-scale statistical runs need not use precisely the same set of records, but the samples used should be provably comparable.

Previous experience studying biblio-

graphic records suggests that samples of a few hundred or even a few thousand records might not yield results that are nearly as meaningful as much larger samples. Sample sizes depend in part on the variability of the population being studied, and bibliographic records vary widely. It would be easy to select 500 current USMARC books records and show that each one will fit on a single screen, including all bibliographic fields, with substantial amounts of blank space on the screen and with labeled fields. It would not be much more difficult to select a different set of five hundred records and show that the majority requires more than one screen, even excluding notes. In either case, the set of bibliographic records might appear to be a representative sample.

Conclusions reached by studying a few dozen or even a few hundred records must be considered questionable; the records may not be representative, even though selected randomly. In order to make some meaningful statements about space requirements for a bibliographic display, the displays should be tested against thousands of records. Ideally, the displays should be tested against hundreds of thousands of records, a large enough and broad enough sample to reduce the effects of a highly variable population. Early test runs confirmed previous experience as to the extreme variability of bibliographic records: samples of a few thousand records could vary from one sample to the next.

Few institutions have the processing capacity or database needed to run such massive test runs. RLG has some excess computer capacity during certain hours of certain days and had more excess capacity in late 1985 and early 1986. Even with that excess capacity, only an efficient testing program could actually prepare simulated screen displays for several hundred thousand records. If the program required one tenth of a processing second to format one record, a 300,000-record sample would require the complete resources of the computer for more than eight hours.

Finally, large-scale tests of directly comparable data must yield legitimate results. That means that the database must be comparable to an actual online catalog, that display tests must provide a reasonable simulation, and that results must be stated in a way that allows direct comparison.

Most informal studies of display effectiveness yield inadequate results either because the tests are not comparable or because the tests are too small. The RLIN Monthly Process File provides a comparable database for multiple tests, and efficient programming made it possible to test as many as 400,000 records for different displays.

The third factor—that the database is comparable to actual online catalogs—is difficult to measure. One legitimate question about RLIN tests is their applicability to public libraries, since RLG is a consortium of university and research libraries. The results of RLIN studies should be directly appropriate for large academic libraries but might be less meaningful for public libraries.

Fortunately, some 8% of RLIN cataloging is by public libraries using RLIN services. We were able to extract 34,000 records from the Monthly Process File representing public library cataloging (excluding the New York Public Research Libraries, not comparable to other public libraries). While that sample is smaller than the overall sample, the test results still reflect a sufficiently large sample to be useful.

The Research Plan

The project that began following the Lakeway Conference was intended to yield two results:

1. A software tool to prepare sample screens for, and measure space requirements of, given bibliographic display designs; and
2. An initial set of tests using that tool.

The first phase was to prepare the tool in rough form and demonstrate that it could be used economically to produce useful results. The second phase required the expertise of professional librarians and would benefit from more than one analytical mind and eye. A third phase became evident as work began on the first phase: making the results available to the library community in a useful manner. That required some form of publication and distribution.

Monthly Process File

RLG maintains a file called the Monthly

Process File, containing all RLIN records added or updated using the online RLIN system during the most recent six weeks. The Monthly Process File covers all material formats (books, serials, maps, scores, sound recordings, machine-readable data files, visual materials, and archival and manuscript control) and generally contains 700,000 to 900,000 records. That total includes records stored in order to generate printed reports; it also includes acquisitions records for items not yet received or fully cataloged. The total also includes duplicates, since a record appears once for each day it has been modified. Eliminating acquisitions information, duplicates, and records stored to produce reports, the Monthly Process File typically contains 350,000 to 500,000 cataloging records.

Because the Monthly Process File is a batch file on disk, it can be processed rapidly. Experience with other programs suggested that it should be possible to process 200 or 300 records in a second of computer-processing time, making it feasible to use the entire file for some tests.

The file is clearly representative of current cataloging and current retrospective conversion work, at least for large research libraries. While the file changes every day, a series of tests run during the same month will include much of the same database in each test. We were able to determine, by doing comparative studies four months apart, that the typical pattern of field occurrence and length stays relatively stable within the Monthly Process File. For example: in December 1985, the file showed an average of 124.7 topical subject headings for every 100 records, with an average field length of 31.9 characters. Four months later, the file—then presumably representing an entirely different set of records—showed 124.0 topical subject headings for every 100 records, with an average field length of 32.0 characters: almost identical occurrence and length.

RLIN Reports System

The RLIN Reports System[4] demonstrates that table-driven MARC formatting routines can run efficiently and includes much of the software needed for a bibliographic display testing system. As much as 90% of the code needed for a display testbed system was taken directly from the RRS system, without modification. The overall design and remaining 10% of coding was a modest one-person project.

New Tools from Old

The RLG Bibliographic Display Testbed, shortened to RBDISP as a program name, represents a good example of building new tools from old and shows some of the benefits of modular code and table-driven systems. The basic software and modular coding routines provided two enormous advantages:

1. Basic routines, some of them quite complex, could be adapted without complete recoding. That included syntax analysis routines (to handle the control tables), all of the general-purpose bibliographic listing routines and most of the special-purpose routines, and most of the file and MARC handling techniques.
2. Many routines could be used without modification by including modules of source code during compilation. Use of common includable routines assures that related programs can be kept up-to-date: once the common routines have been modified, separate programs need only be recompiled. This technique was used, but less thoroughly than might have been ideal.

Proving the Strategy

The Lakeway Conference took place in March 1985. On June 3, 1985, I prepared an informal "pre-project proposal" memo discussing the ideas and outlining a preliminary schedule. Work before June was strictly informal; the memo made it a visible project and recognized that the latter phase would involve more people. Because the program would be useful in designing any potential RLIN-based public access workstation, some of the initial design was funded as part of the Getty project.

Original Coding

Analysis during April and May suggested several items that needed to be added to RRS capabilities. These included

- The ability to define 24-line "screens" and to reserve portions of a screen for messages and other items, so as to make a realis-

tic simulation of online displays;

- The ability to define label areas and label alignment;
- The ability to generate screen images within the program, in order to take statistical measures without actually printing each screen image;
- The ability to print some portion of the screen images, including both single-screen and multiple-screen records; and
- The ability to produce a statistical summary, including measures of screen density and measures of space requirements.

Speed was also important. Unless the program could process records at a high rate, we would need to limit the number of records tested or reduce the number of possible tests. I was able to develop an initial version of RBDISP by July 25 and demonstrate that it worked and produced useful results. On July 25, a preproject completion memo was prepared, outlining the remaining phases of the project.

REFINING THE PROJECT

The July 25 memo set forth the remaining steps in the project:

1. Detailed definition, further defining the limits of testing alternatives and the scope of the project;
2. RBDISP revision, reflecting recent MARC updates and based on recommendations from library systems analysts;
3. RBDISP documentation, so that those involved in the project would understand the control syntax and be able to define display possibilities;
4. Initial operation, preparing a preliminary set of results;
5. Initial reporting, to suitable RLG groups and, possibly, in the professional literature; and
6. Ongoing operation, to serve RLG members and possibly to serve non-RLG libraries on a fee basis.

Between July 25 and early October, the work continued as a one-person project for refining the software and developing some documentation. During those months, it became clear that the project could work and would yield valuable results. It also became clear that the results would be too extensive for journal publication and that they should reach a wider audience than RLG's members and users.

In October 1985, after being approved as a small project within RLG, the project was allocated small amounts of time from two library systems analysts: Lennie Stovel and Kathleen Bales. Both analysts provided professional insight and experience from library settings, and Lennie Stovel had recently been involved with implementing an online catalog. The three project members worked as a team. Lennie Stovel and Kathleen Bales provided most of the specific ideas for display possibilities and provided many critical insights. I was able to improve the program based on their suggestions. Other RLG staff members provided reactions to some display alternatives and provided editorial comments later during the project, but the two analysts made the project work.

Planning Publication

The library community has several models for handling extensive research results:

- Internal publication with no formal distribution, or no publication at all;
- Internal publication, filed with ERIC;
- Formal publication with distribution from the organization; and
- Commercial publication.

The first alternative essentially buries the results; the second is only slightly better, as ERIC documents are only available to knowledgeable researchers. The third alternative would require that RLG act as a publisher, handling individual orders and payments from hundreds of outside agencies. The fourth alternative, commercial publication, would yield the broadest distribution. When project approval was given, I was encouraged to approach commercial publishers to see whether they would consider publishing the results of the RLG Bibliographic Display Testbed project. After some discussion, a prospectus was prepared and submitted, resulting in a contract from Knowledge Industry Publications (KIPI) to publish *Bibliographic Displays in the Online Catalog*. The contract changed the project, adding deadlines and specific goals: a text and illustrations to be

delivered to KIPI. The team began to refine the schedule and set intermediate milestones.

PROJECT DEVELOPMENT

Between December 1985 and March 1986, work proceeded on the software and on display tests. Software changes included routines to include or exclude fields such as author-added entries, depending on whether or not they contained a title subfield ≠t.

Early Tests

Early tests included a range of different overall screen designs, a range of options for data to be displayed, and a range of labeled and unlabeled possibilities. Several dozen alternatives were tested. Most such tests did not use the full Monthly Process File; instead, one day's processing (15,000–25,000 records) was used, with a few dozen sample screens printed for each test.

The early tests provided many interesting possibilities, but showed some real problems in preparing meaningful results. Each display differed in so many ways from other displays that it was difficult to evaluate what each difference meant. The tests were leading toward an extensive series of possible displays, with little hope of showing the effects of specific display decisions.

We also noted that it was important to be able to look at the same records, displayed using different alternatives, and that records for materials other than books showed special problems and needed special attention. Working from several hundred samples, we arrived at a set of records to serve for direct printed comparisons among sets of displays. That set finally included 20 records: 8 to be used for all displays, and another 12 to point up special problems of nonbook materials.

Early analysis of statistical results also suggested that we needed to make one adjustment in the test universe. RLG helped to design the Archival and Manuscripts Control format (AMC), and RLG members have made heavy use of that format. While AMC records only make up about 1% of the Monthly Process File, the records are substantially longer and more complex than most other records—about 50% longer on average, with more than twice as many access points. Since most libraries would have few AMC records in the online catalog, we felt that these records would make the tests less realistic. A separate series of tests focused only on AMC records.

We also found that other nonbook materials had different characteristics and deserved special testing, but that the mix of records in RLIN was not so extreme as to cause difficulty. We decided that the final report should include statistical breakdowns for each material format, but that most tests should use all cataloging records except AMC.

Narrowing the Universe

As we ran through more tests, the problem of having too many choices became more and more apparent. We finally agreed to narrow the alternatives in a way that would allow some reasonable comparisons. That required several difficult decisions, arrived at through discussion within the project team.

First, we settled on a single overall screen format—a uniform set of messages for the top and bottom of the screen and a uniform area for bibliographic display. Second, we settled on a single set of data elements to be included in medium-level displays and established medium level as the most important level for the project. We defined *medium level* as including a full bibliographic description and all access points: enough information to satisfy the great majority of patron needs, when taken along with holdings and location information. The analysts later defined *brief-level* and *long-level* sets of data elements. For most tests, the team also agreed on a single set of labels to be used in all labeled displays.

Those decisions reduce the universe of possible displays considerably. We then established a series of display alternatives, changing only one display element from one test to the next. We found that the series showed significant and visible changes, and that the narrow changes made it possible to focus on specific effects of display decisions.

We finally settled on two sets of display alternatives for medium-level displays, one card-like and one labeled. Those sets were

extended in two different ways. First, using one card-like and one labeled display design, we used different sets of data elements: three taken from the library literature and two (one brief and one long) designed by the project analysts. Second, each analyst was invited to prepare "designer's choice" displays differing from the test series. All such displays were tested against the Monthly Process File to produce statistical results and against a selected set of records to produce display samples.

PROJECT RESULTS

The narrowed testing resulted in several hundred directly comparable bibliographic displays and several thousand statistics. These figures and statistics, together with a discussion of the specific aspects of bibliographic displays covered within the testing, are available in book form from Knowledge Industry Publications: *Bibliographic Displays in the Online Catalog*, by Walt Crawford, with Lennie Stovel and Kathleen Bales.

The tests do not prove that a particular bibliographic display is ideal but do provide some interesting comparisons and examples. Some of the results are

- The analysts managed to arrive at some good solutions to the more difficult labeling problems for bibliographic data. For example, *PUBLISHED:* seems to work well for the imprint statement (field 260), and *MATERIAL:* is a good label for the physical description (field 300). All three project team members are satisfied that physical description is essential for many nonbook items and can be useful for books.
- Joseph Matthews' suggested guidelines seem generally workable. The combination of right-aligned labels with left-aligned text sounds odd, but works quite well. "Gutter alignment," as we came to call it, allows experienced users to ignore labels while keeping labels extremely clear and specific for less experienced users. His suggestion that text ought not to be more than 50 or 60 columns wide also works well in practice.
- The suggestion that a display should not use more than 30% of the available character spaces, and ideally not more than 15%, turns out to be irrelevant when other guidelines are observed. RBDISP uses an unusually severe definition of density: single blank spaces between words are counted as characters, not as white space. Even with this severe definition (and an accompanying error that causes the space before each line of text to be considered as text), not one of the tested display alternatives averaged more then 30% local density. Some display alternatives did show more than 30% local density when tested against maps, sound recordings, or visual materials, but medium-length displays typically used from 22% to 30% of the available display space.
- The analysts and observers generally prefer labeled displays with some vertical spacing, but card-like displays do make it more likely that a record will fit on a single screen. The most generally satisfactory labeled display (see figure 1) required more than one screen in 59% of tested cases (assuming three lines for holdings); a card-like display with the same information and some vertical spacing (see figure 2) required more than one screen in only 24% of tested cases.

Public Libraries versus Research Libraries

We were particularly interested in the differences between public library cataloging and overall RLIN cataloging, since RLIN is heavily biased toward research libraries. Some of us suspected that the differences would be small, since most public libraries that are likely to have online catalogs use shared technical processing systems for their cataloging. When a library derives almost all of its cataloging from existing records, we suspect that the library does not spend much time deleting information.

While the public library record for a given title is likely to be as complete as the research library record (because it will be the same record), public libraries should tend to have somewhat less arcane materials, thus somewhat less complex records. How significant is the difference?

After performing dual tests, our conclusion is that public library records are indeed simpler than those for research libraries—but not very much simpler. A higher percentage of public library records will fit on a single screen for a given display, but the relative differences between display alter-

```
Your search: Bossa nova U.S.A#                                  MEDIUM Display
     Finds: 1 record                                            Screen  1 of  2
-------------------------------------------------------------------------------

        TITLE: Bossa nova U.S.A. / [as performed by] the Dave Brubeck
               Quartet ; piano solo transcriptions by Howard Brubeck.
    PUBLISHED: San Francisco, Calif. : Derry Music Co. ;  New York, N.Y. :
               C. Hansen, distributor, c1963.
     MATERIAL: 49 p. of music ; 28 cm.

        NAMES: Brubeck, Dave.
               Brubeck, Howard R.
               Dave Brubeck Quartet.

     SUBJECTS: Piano music (Jazz), Arranged.
               Jazz quartets--Piano scores.

        WORKS: Brubeck, Howard R. Theme for June; arr.

-------------------------------------------------------------CONTINUED-------
NEXT ACTIONS      Key: ? for help                 + to see the next screen
                       L to see a Longer display  - to see the previous screen
                       F to Find other items      Q to Quit
NEXT ACTION? _                                                        LMGAT
```

Fig. 1. Labeled Display.

```
Your search: Brubeck, Dave#                                     MEDIUM Display
     Finds: 1 record                                            Screen  1 of  1
-------------------------------------------------------------------------------

        Brubeck, Dave.
          Bossa nova U.S.A. / [as performed by] the Dave Brubeck
        Quartet ; piano solo transcriptions by Howard Brubeck. --
        San Francisco, Calif. : Derry Music Co. ;  New York, N.Y. :
        C. Hansen, distributor, c1963.

          49 p. of music ; 28 cm.

          1. Piano music (Jazz), Arranged. 2. Jazz quartets--Piano
        scores. I. Brubeck, Howard R. II. Brubeck, Howard R. Theme
        for June; arr. III. Macero, Teo, 1925- Coracao sensivel;
        arr. IV. Dave Brubeck Quartet.



-------------------------------------------------------------------------------
NEXT ACTIONS      Key: ? for help                 + to see the next screen
                       L to see a Longer display  - to see the previous screen
                       F to Find other items      Q to Quit
NEXT ACTION? _                                                        CMSX
```

Fig. 2. Card-like Display.

natives stay about the same. For example, the well-spaced card-like display in figure 2 did even better for public libraries: only 11% of records required more than one screen, as compared to 24% overall. For the labeled display in figure 1, 48% of public library records required more than one screen as compared to 59% of all records.

More Results

It is impossible to summarize the full results of the project in this article, given

the direct relationship of statistical results to sample displays. Figure 3 shows the MARC fields used as the medium-level definition for most tests. Figures 4 and 5, taken directly from *Bibliographic Displays in the Online Catalog*, show test results for nine of the tested displays. These figures may not be very meaningful in the absence of display samples, but do give some sense of the wide range of results encountered in the study.

In figure 4, "One Screen w/Holdings" is the percentage of records that could be displayed on a single screen, leaving at least three lines available to show minimal holdings and location information (one blank line, one line of column labels, and a single line of holdings and location information). "One Screen: bib. only" shows the percentage that could be displayed on a single screen without leaving space for holdings, and "Two Screens bib. only" shows the percentage that required a second screen for bibliographic information.

In figure 5, "Local Density" is the percentage of all available spaces within the central portion of the screen that were used for text. The central portion of the screen is the portion between the rows of dashed lines (as in figure 1 and figure 2). That area contains 16 lines of 80 spaces, or a total of 1,280 spaces. If a particular display design results in an average of 256 characters per screen (not per record), it has an average local density of 20%. "Global Density" includes the entire screen and counts all characters appearing on the screen, including the lines of dashes. "L. Density to 30%"

100-130	Main Entry
245	Title Statement
250	Edition Statement
260-262	Publication, distribution, etc.
300-305	Physical Description
400-490	Series Statements
600-699	Subjects
700-799	Added entries

Fig. 3. Fields Included in Medium Displays.

Display	Name	One Screen w/Holdings	One Screen: bib. only	Two Screens bib. only
CMTW	Cardlike, Wide	98.45%	99.90%	0.10%
	-- public libraries	99.67%	99.98%	0.02%
CMTN	Cardlike, Narrow	92.47%	99.14%	0.85%
	-- public libraries	97.52%	99.84%	0.16%
CMSX	Cardlike, Spaced	76.16%	97.08%	2.90%
	-- public libraries	88.79%	99.25%	0.75%
LMLFT	Labeled, Flush-Left (both)	87.11%	98.34%	1.63%
	-- public libraries	92.21%	99.42%	0.58%
LMG	Labeled, Gutter, Groups	81.37%	96.67%	3.29%
	-- public libraries	89.05%	98.83%	1.16%
LMGSP	Labeled, Gutter, Spaced	55.31%	90.11%	9.84%
	-- public libraries	67.15%	95.54%	4.46%
LMGAT	Labeled, Author/Title Split	41.23%	85.06%	14.87%
	-- public libraries	51.74%	92.43%	7.56%
LMGAT17	LMGAT with more entry lines	85.06%	97.30%	2.68%
	-- public libraries	92.43%	99.16%	0.84%
LMGAT50	Narrower LMGAT	33.92%	77.84%	21.98%
	-- public libraries	45.34%	88.28%	11.69%

Fig. 4. Screen Summary Statistics

Display	Name	Local Density	Global Density	L. Density to 30%
CMTW	Cardlike, Wide	26.00%	35.69%	70.69%
	-- public libraries	21.31%	32.93%	85.08%
CMTN	Cardlike, Narrow	26.06%	35.73%	69.86%
	-- public libraries	21.50%	33.04%	84.44%
CMSX	Cardlike, Spaced	25.54%	35.42%	71.41%
	-- public libraries	21.37%	32.96%	84.93%
LMLFT	Labeled, Flush-Left (both)	29.76%	37.97%	57.33%
	-- public libraries	25.25%	35.35%	73.73%
LMG	Labeled, Gutter, Groups	28.98%	37.38%	59.21%
	-- public libraries	24.90%	34.97%	75.44%
LMGSP	Labeled, Gutter, Spaced	27.24%	36.47%	65.65%
	-- public libraries	24.11%	34.61%	78.70%
LMGAT	Labeled, Author/Title Split	25.59%	35.54%	73.06%
	-- public libraries	22.99%	34.03%	83.93%
LMGAT17	LMGAT with more entry lines	22.30%	33.69%	84.83%
	-- public libraries	19.08%	31.28%	93.57%
LMGAT50	Narrower LMGAT	24.06%	34.75%	80.21%
	-- public libraries	22.14%	33.63%	87.89%

Fig. 5. Density Summary.

gives the percentage of screens that had local density less than or equal to 30%, sometimes considered to be the highest density for good clarity. In other words, of the displays included in figures 4 and 5, display LMGAT17 resulted in highly dense screens only 6.43% of the time for public library records; display LMLFT resulted in highly dense displays 42.67% of the time, for all RLIN records.

The published report includes many more display designs, hundreds of sample screens, and more complete explanations. It also includes three more categories of statistical information:

- Holdings room on the first screen: the percentage of records that, using a given display design, leave at least 4 blank lines, at least 6 blank lines, or at least 8 blank lines available for holdings and location information.
- Field occurrence and average length: tables showing how frequently each USMARC field (except 001, 005, and 008) appear within the studied population (6 weeks of current RLIN cataloging and maintenance), and the average text length of each field (ignoring the 5 characters representing minimum MARC overhead).
- Format-specific results: field occurrence and length tables for each material format (books, serials, maps, scores, sound recordings, visual materials, archival and manuscript control, and machine-readable data files) and for public library cataloging; display test results for each nonbook format, for the most significant display designs.

PROJECT LIMITATIONS

The RLG Bibliographic Display Testbed project was successful in its specific aims. RLG now has a tool that can be used to provide both sample screens and large-scale statistical measures for new online display possibilities. We also have a body of examples and evidence that are being made available to the library community in the most effective possible way. The project was limited, and the results were even more limited than the original project. Some of those limitations follow.

Continuation Screens

One curious limitation in the RBDISP program has to do with the display of second and third screens. The top and bottom of the screen can have proper indications,

for instance "Screen 2 of 4" and "CONTINUED," but the program does not repeat any portion of the bibliographic entry from one screen to the next.

Near the end of the initial project, Lennie Stovel proposed a change to RBDISP, to repeat a portion of the entry from the first screen on continuation screens. That change will eventually be made, but initial analysis showed it to be somewhat complex. The published results do not include realistic continuation segments, but future uses of RBDISP may include such segments.

Print versus Screen

RBDISP prepares screen images on paper: 80 characters per line, 24 lines, with a border showing curved corners. Those images reflect the layout of screens but do not by any means duplicate actual displays. The printed images have a clear black line around the text, in a crisp oblong quite close to the text. Real displays have a significant area of the screen that is not used for text, and the screen is typically surrounded by a housing that forms a mild contrast rather than a stark border.

Printed characters are both smaller and clearer than characters on a screen and are black on white, rather than the typical amber or green on black. The printed samples actually use a dot matrix printer (the Xerox 9700 laser printer), but individual characters use a 24-by-40 dot matrix, much denser than the 7-by-9 or 9-by-14 matrix of good-quality terminals. Once transferred to the printed page, it is virtually impossible to distinguish the dot matrix characters of RBDISP samples from typewritten characters. That is not a realistic simulation of the much less distinct terminal screen.

Finally, a good online display uses reverse video, half intensity, or other forms of highlighting to draw attention to certain elements. No such highlighting was available in the printed displays.

These limitations are common to most printed simulations of displays. We did manage to avoid one very serious problem with printed simulations: some printed simulations use proportional type, eliminating any direct relationship to spacing on a screen. The character set used for RBDISP displays is not proportional and retains the exact horizontal relationships that would appear on a screen.

Multiple-Record Displays

The project was limited to single-record displays. Multiple-record displays also need study. Unfortunately, any study of multiple-record display quality must take into account not only the display itself but the number of records to be expected in a result set. Such research could be quite useful, but we could see no way to build it into this project and still complete the project.

NEXT STEPS

The initial project came to an end in May 1986, when the manuscript and figures were submitted to KIPI. The book appeared in October 1986. As a research project, the RLG Bibliographic Display Testbed is finished. As a tool, RBDISP continues to be useful.

RLG continues to study ways in which powerful workstations could be used, either in connection with RLIN itself or with a replicated version of the RLIN software. One such application appears to be patron access systems for research libraries. When RLG considers development of such systems, or of any other more user-friendly interface to RLIN software, we will use RBDISP as a tool to test displays and evaluate their performance.

RLG owner-members may also find RBDISP useful as a way to evaluate new display possibilities. The software will be maintained and may be made available for use by our members to the extent that their interest and our computer capacity (and staff time) permit.

RBDISP is RLG software, and RLG is a membership organization. We took some pains to make the results of the initial project available to the library community. We hope that those results will prove useful to many librarians and vendors in designing new displays.

Could non-RLG libraries use RBDISP? No decision has been made, either to forbid such use or to make it possible. Any such use would depend on interest expressed, on

staff and computer availability, and on determining a fair service charge. We are explicitly keeping the question open.

CONCLUSIONS

Online catalog design sometimes suffers from an abundance of opinions and scarcity of facts. RLG was able to use internal capabilities to mount a large-scale statistical study of bibliographic displays, yielding results that should help to guide future designers. The study was limited in scope and as a result could be designed and carried out rapidly, at little cost to RLG and at no cost to any outside agency. The extensive results have been published commercially, making them available to a wide audience at a reasonable price. The results confirm some assumptions about the effects of display decisions and provide numbers to back those assumptions. Labeled displays are more legible, but do take up more room than card-like displays; the study shows how much more room and explores some variations on card-like and labeled displays.

This study should help future designers but will not, in and of itself, cause major improvements in online catalog design. The library world needs dozens and hundreds of small research projects focusing on specifics to complement major, multi-institutional, grant-funded research. The cumulative effect of such projects cannot help but improve online systems and other library systems, providing better access to library materials.

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2. Walt Crawford, "The RLIN Command Analysis System: Measuring Use and Performance of an Online System," *Information Technology and Libraries* 4:29–52 (Mar. 1985).
3. Appendix A covers aspects of small, informal research called "pocket projects."
4. Walt Crawford, "The RLIN Reports System: A Tool for MARC Selection and Listing," *Information Technology and Libraries* 3:3–14 (Mar. 1984).

APPENDIX A. POCKET PROJECTS: NOTES ON SMALL-SCALE RESEARCH

Some research can be small enough to fit into the category of "pocket projects"—those carried out on an almost wholly informal basis using pockets of free time in the midst of higher-priority projects. Pocket projects can become formal projects after informal work has demonstrated worth and feasibility. Many new projects within organizations begin as informal, pocket development efforts. Some organizations even formalize pocket projects as a proper way to develop new ideas; the business journalism term for such efforts is *intrapreneurship*.

Informal Design

One key to pocket projects is informality, at least in the early stages. Planning and development must take place in small portions as time permits; that can only work in the absence of specific deadlines and with a clear realization that the project may change drastically as it proceeds. Informality implies an easy ability to change a project's design and scope. It also implies that the project can be abandoned along the way.

It does not imply either secretiveness or sloppiness. Secret projects, those carried out without the knowledge of immediate supervisors, are inherently dangerous projects and should be avoided. Pocket projects should not be sloppy, though their organization may be so casual as to appear nonexistent. A pocket project should have an explicit goal and informal milestones. An outline processing system on a personal computer provides a good way to develop a pocket project and track its progress without adding significant overhead.

Most pocket projects take place over long periods relative to the size of the project. When something takes up only 5% or 10% of the work week—or, more likely, 25% one week and no time at all for three weeks following—a tracking mechanism is important to recall what has been done to date.

Using Leverage

The best pocket projects are those that take advantage of existing strengths. Leverage can be stated in this form: what can we do easily that could not be done as easily elsewhere? Good

pocket projects use the leverage available within an institution to achieve significant results at a small cost. Most institutions, including most libraries and library-related organizations, have their own strengths. One public library may have an unusually high caliber of volunteer workers; another may have developed close informal ties to a university library or special library in the same area. Some library-related organizations have access to graduate students in library schools; others may be able to call on informal support from computer scientists or from various visible and invisible networks.

The RLG Product Batch Group began by developing a generalized approach to MARC record handling and more recently developed generalized bibliographic listing capabilities. Those efforts provide a basic set of software that makes specific batch-processing projects must faster and simpler. During late 1985 and early 1986, the RLIN computer system had excess computing capacity during the early morning and late afternoon, making it possible to carry out resource-intensive computing jobs without delaying other jobs or incurring real expense. Finally, RLIN uses a large batch file of contemporary cataloging to carry out a number of functions. All three factors provided leverage for the RLG Display Testbed project. Other institutions, and other areas within RLG, would have different sorts of leverage in other areas.

Demonstrating Feasibility

Very small pocket projects go from idea to completion with few visible steps in between. Larger projects, and particularly those that cannot be completed as single-person projects, require at least one intermediate milestone: proof of feasibility.

A demonstration of feasibility is, ideally, a working version of the project's basic tools, though possibly without some of the finishing touches. Large-scale projects sometimes begin with feasibility studies, attempts to determine the likelihood of success and estimated cost. Pocket projects typically cost less than a full-scale feasibility study; instead, a good pocket project results in a fully functional prototype.

For the most informal pocket projects, the feasibility milestone should assure the person working on a project that the work is going somewhere. It may be sensible to set a flexible deadline for proof of feasibility, a point at which design refinements must take a backseat to showing a working tool.

For more formal pocket projects and specifically for pocket projects that result in multiperson projects, proof of feasibility is a critical milestone. Once a project is known to be feasible, the proponent can discuss its larger implications and ask for explicit recognition of the project.

Narrowing the Scope

Pocket projects can start out as vague ideas, and vague ideas tend to cover a lot of ground. The single person working on a pocket project should begin to narrow the project's focus at an early stage and should continue narrowing the project until it shows a clear focus.

In some cases, narrowing must continue through the end of the project. When a project involves both a set of tools and applications for those tools, the tools may offer a broader range of applications than can reasonably be carried out in a single pocket project. The RLG Bibliographic Display Testbed project is a case in point; the focus of the project continued to be narrowed until completion, and the project team deliberately left many avenues of research unexplored.

Focus is important to any project, from single-person pocket projects to projects as vast as RLIN II or the Oxford Project. As a project moves forward, insightful people will see new areas that could be explored. Those insights should be encouraged and recorded but should not necessarily have any direct effect on a project. New ideas may cause changes in the project's focus, but a project can easily become overburdened with side issues, to the point where it ceases to have any single goal.

Establishing Explicit Goals

A pocket project must have goals. The goals can begin informally; the RLG Bibliographic Display Testbed began with a goal to "develop some statistical evidence on functional aspects of bibliographic displays." The goals should be refined as the project is refined. A second milestone for most pocket projects is the establishment of realizable goals.

It's important to know what success looks like—how will you know that a project is working, and when can you consider it complete? Some projects can go on for years. Unless they are split out into smaller subprojects, participants have the frustration of never seeing a concrete result from their work. Most of us find it very satisfying to reach a specific goal; pocket projects in particular require specific, achievable goals.

Conclusion

The RLG Bibliographic Display Testbed project is only one small research project in a field that must see many varied projects. Other analysts and institutions should look to their own special strengths and consider the contributions they can make toward a body of reliable information on online systems and other aspects of library service. ■■

Newspaper Indexing: Using an IBM Mainframe Computer and a Text-Formatting Program

Celia Wall

The introduction of computers into libraries during the past ten years has created new options for those libraries wanting to establish an index to local newspapers. This paper reports on how Murray State University Library, a medium-sized academic library, made use of an IBM mainframe computer and SCRIPT, a text-formatting program, to index two local newspapers. The process is one that can be adapted for use with a microcomputer and word processing software.

Newspapers as reference sources are a mixed blessing—a fact to which any public service librarian can attest. On the one hand the value of newspapers to researchers is well known. From a large daily such as the *New York Times* that serves as the newspaper of record for a nation to a small weekly newspaper that chronicles the life of one narrow segment of rural America, newspapers are a mainstay of research in many fields. Gaining access to the subject content of newspapers is, however, a major problem for researchers, particularly when their need is for information contained in the smaller papers.

The large, major dailies such as the *New York Times* and *Washington Post* are commercially indexed. Advances in computer technology in the past ten years and the accompanying creation of online news databases have meant even easier access to the larger newspapers. Thus, a researcher interested in how the budget of the Tennessee Valley Authority has fared during the Reagan administration can easily find sources through the commercially produced indexes, either in print or online. Suppose, however, this same researcher is interested in how cuts in TVA's budget during the Reagan administration have affected the people in TVA's service areas. What better source than the local papers in these areas? A researcher can be assured these papers have carried stories on services cut, people laid off, and effects of these budget cuts on the area's economy. Yet, as a result of the lack of indexes to such papers, the researcher is forced to plow through seemingly endless reels of microfilm to locate the needed stories.

Because of this problem of access, most libraries at one time or another consider the idea of indexing local or regional newspapers. Many decide against starting such a project though, because they determine it will be more of an investment in time and personnel than they are willing or able to commit. In the past ten years, however, the introduction of the computer into more and more libraries has created new options for those interested in starting a newspaper index. Still, some of these options are too expensive for the library whose local daily has a circulation of only a few thousand. Other

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options require more technical knowledge of computers and programming than many libraries have available—or want to devote to this type of project.

There is an alternative that is relatively inexpensive and requires only the most basic knowledge of computers. This paper is an examination of that alternative as it has been successfully applied to maintenance of an index to two local newspapers for the past three years.

THE IBM TEXT PROCESSOR

In 1983 reference librarians at Murray State University Library decided to begin indexing two newspapers: (1) *Murray Ledger and Times*, the local daily newspaper, and (2) *Murray State News*, the weekly campus newspaper. The decision that such an index was needed was based upon the librarians' experiences at the reference desk—patrons' questions indicated such a need did, in fact, exist. The reference librarians were in agreement that the index should be computer-produced. A meeting with the university's Computer Center staff proved disheartening, however. Such a project would be near the bottom of their list of programming projects. They encouraged the librarians to search for a preexisting program, an idea that would involve a cost the librarians had not anticipated and could not afford for this type of project.

The librarians had approached the Computer Center about writing a program for the index because such a program would permit easy updating: it would do the work of inputting updated citations under the proper heading in the proper order. With this option unavailable, the librarians decided to explore a second option—of using the text-processing capabilities of the university's mainframe computer. While this method would be more cumbersome to use, it was the only alternative—besides the card file that the librarians refused to consider—if the index were to exist.

The author had been using the university's mainframe computer, an IBM 4341 Model 2, ever since a satellite center had been set up in one of the library's group-study rooms. The operating system used on the mainframe was McGill University System for Interactive Computing (MUSIC); a MUSIC support package, SCRIPT, was the text-formatting program package that the librarians decided to use for inputting the newspaper index.

INDEXING PROCEDURES

The author, a former newspaper librarian with experience in newspaper indexing, was given the responsibility for setting up and maintaining the index. The procedures established were simple.

Indexing

Each morning the author reviewed the previous day's newspaper,* writing out a 3- by 5-inch card for each story to be indexed. The entry on the card included (1) the headline, oftentimes augmented to make it more informative; (2) the abbreviation for the appropriate newspaper, "L&T" or "MSU News"; (3) the publication date; (4) the page number; (5) the column number; and (6) the subject(s) under which the article was to be input (figure 1).

The indexing was done on a daily basis, usually while the author worked at the reference desk, and required a rough total of 2 to 2.5 hours per week. Only during vacations and holiday periods was the indexing allowed to fall behind.

Authority Lists

Early on, the decision had been made to create subject headings from the articles themselves and not to use a published authority list such as *Sears* or *Library of Congress*. Therefore, it was necessary to keep an up-to-date record of subject headings and personal names used. Each day the author checked the headings assigned against computer printouts of two authority lists. One list was of subject headings (figure 2), the other of personal names (figure 3).

Any subject headings or personal names added during that day's indexing were noted in red on the printouts, along with any cross-references needed. Corrections to these two files, which were also maintained on the computer, using SCRIPT, were

*The library had made arrangements with the *Murray Ledger and Times* to receive a free subscription to the paper in exchange for a copy of the finished index.

Fraternities Eye Dry Rush Proposal.
MSU News, 2-21-86, 1:1.

Alcoholic Beverages—Calloway Co.

MSU—Fraternities & Sororities

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Fig. 1. Sample Index Card.

made at irregular intervals when deemed necessary by the author. New printouts were run after making corrections.

Input

Once the subjects were checked by the author, the 3- by 5-inch cards were given to a student worker for inputting into the computer. When permitted by the student's work schedule, the inputting was done on a daily basis. Seldom did the lag time between indexing and inputting exceed a couple of days.

Inputting involved three steps: (1) logging onto the computer; (2) updating the appropriate file(s); and (3) logging off. To sign onto the computer, all the student had to do was type in an ID number followed by a password. Once logged on, the next step was to get into the file to be updated. The command for this was: "tedit filename." The requested file would then appear on the screen.

Initially the newspaper index was one large file with citations listed in alphabetical order by subject, then in chronological order by date of publication. This meant that if the only entries to be added were in the *Ms*, the student had to move through all the citations from *A* through *L* to get to the correct location. Eventually the file was split into five smaller files permitting easier, faster searching. Since a high percentage of entries were under "Murray State University—etc.," one of the newly created files was for "MSU" entries only.

The Lee Data Corporation terminals were directly connected to the mainframe computer and permitted full-screen, rather than line-by-line, editing. This meant that students saw a full screen of the file at a time and could quickly see where to add the citation—all they needed to do was move the cursor to the line in the file where the new citation was to be added. The cursor could be moved through the text a line at a time, several lines at a time, or a page at a time. Once students found the line where the citation was to be added, they simply inserted the needed number of lines into the existing text and typed in the new citation(s).

The biggest drawback to this method of inputting was that students had to alphabetize the 3- by 5-inch cards by subject before sitting down at the computer. Then, once logged on, they had to search through the file to determine the appropriate location for the new citation. Since the index was divided into five subject files and a personal name file—*and* there were frequently multiple subject headings on the cards—students often had to do a good bit of card shuffling. With a larger index this could be a problem; with a smaller index such as this one, however, it was simply a "nuisance" with which librarians and student workers alike learned to live. Even with this added nuisance, input time for an average week was less than thirty minutes.

Editing

Once all the new citations were entered, the updated file was "saved." The cards were returned to the author, who proofread the cards against the computer file, checking for typos as well as other types of errors. The cards were then filed away temporarily until the next printout was run, approximately every four to six weeks. At

Newspaper Index—Subject Heading List

A.C.T.
  SEE: AMERICAN COLLEGE TESTING PROGRAM
AFL-CIO
AIDS
A. L. WILLIAMS AND ASSOCIATES
ABORTION
AEROBICS
AFFIRMATIVE ACTION IN EMPLOYMENT
  SEE: WOMEN—EMPLOYMENT
AGED
AGENT ORANGE CONTROVERSY
AIR ILLINOIS
AIRPORTS—MURRAY
ALCOHOL ABUSE
  SEE: SUBSTANCE ABUSE
ALCOHOLIC BEVERAGES—CALLOWAY COUNTY
  SEE ALSO: MSU—FRATERNITIES AND SORORITIES
    SUBSTANCE ABUSE
AMERICAN COLLEGE TESTING PROGRAM
AMERICAN TELEVISION AND COMMUNICATION CORP.
  SEE: CABLEVISION—CALLOWAY COUNTY

Fig. 2. Subject Authority List.

Newspaper Index—Personal Name List

Adams, John H. (MSU—English)
Adams, William C. (Contractor)
Allen, Cathy (Teacher)
  SEE: Calloway County School System
Alls, Willard (Lawyer)
Armstrong, David (Ky. Attorney General)
Arnold, Jane (Runner)
Arnow, Harriet S. (Author)
Balentine, David (Sheriff)
Balzer, Karen (MSU—Speech and Theatre)
Barber, Raymond (Supt. of Public Instruction—Ky.)
Barrett, Terry R. (Psychologist)

Fig. 3. Personal Name Authority List.

that point, the cards were thrown away.

The first year the entire 156-page file was edited at the end of the year. At that time one or two of the students in the Reference Department were asked to read through the index and look for the more obvious mistakes. The author then proofread the index, checking for typos, incorrect or incomplete citations, and inconsistent subject headings. At this time the subject headings used in the index were also double-checked against the authority lists and necessary corrections made in both. The edited text was then given to a student who first made

the corrections, then ran off a new printout that the author checked against the edited one to verify that all corrections had indeed been made.

This final editing process was time-consuming. The second year, in an effort to ease the work load at the end of the year, the file was proofread and edited at intervals throughout the year. Since printouts were run every four to six weeks anyway, it was an easy process for corrections to be made at those times. This method of editing the file did ease the load at the end of the year considerably.

Production and Distribution

Once the editing process was completed and all corrections made, a master copy of the index was run on a letter-quality printer. This took several days because the printer had no sheet feeder attachment and sheets had to be loaded by hand one at a time. Also, the printer was one of only two letter-quality printers on campus, which meant it had to be shared with other users. This was a very slow process that was turned over to a student worker.

Once the master copy (figure 4) was run off it was taken to Printing Services, where multiple copies were printed on a small offset press. The cost for printing was $.05 per page for setup and $.01 per copy, and eleven was the minimum number of copies that Printing Services would run. For eleven copies the costs were as follows:

Printing costs	
156 pages at $.05 (setup fee)	$ 7.80
11 copies of 156 pages at $.01	$17.16
Total cost	$24.96
Binding costs	
11 copies at $.26 (spiral binding)	$ 2.86
Labor charges	$ 2.04
Total cost	$ 4.90
Total printing/binding costs	$29.86

The copies were collated by student workers and sent to Printing Services to be spiral-bound. Copies were then distributed.

Conclusions

Three years of indexing on the IBM 4341 using SCRIPT have convinced the refer-

Newspaper Subject Index
July 1, 1985—June 30, 1986

ABORTION
Life House sponsors walk for abortion cause. L&T, 1-20-86, 1:3.
Yes or no? Abortion question comes to campus via satellite. MSU News, 4-18-86, 3:1.
A.C.T.
SEE: AMERICAN COLLEGE TESTING PROGRAM
AIDS
AIDS precautions taken at county hospital. L&T, 8-8-85, 1:3.
AIDS update: 24 cases reported in state, but none in local area. MSU News, 10-11-85, 2:1.
30 confirmed cases of AIDS are verified in Kentucky, study says. L&T, 10-26-85, 1:1.
AFFIRMATIVE ACTION IN EMPLOYMENT
SEE: WOMEN—EMPLOYMENT
AIRPORTS—MURRAY
Airport board reviews three subsidized projects. L&T, 12-19-85, 2A:4.
ALCOHOLIC BEVERAGES—CALLOWAY COUNTY
SEE ALSO: MSU—FRATERNITIES AND SORORITIES
Wet or dry? Today's Supreme Court ruling confusing to officials trying to determine how recent vote will be affected. L&T, 7-3-85, 1A:2.
Precincts will not be able to vote wet. L&T, 7-8-85, 1:3.
Beverages confiscated in sting operation. L&T, 9-30-85, 1:5; MSU News, 10-4-85, 1A:5.
Fraternities eye dry rush proposal. MSU News, 2-21-86, 1:1.

Fig. 4. Sample of Index Entries

ence librarians at Murray State that this is an excellent alternative to both a 3- by 5-inch card file and to the more sophisticated and expensive computer systems used for such indexing purposes.

In 1985 the decision to continue the indexing project was made. At that time the actual indexing was turned over to the Reference Department clerk. Each day, after the clerk finished the indexing, she gave the newspaper(s) and cards to the author, who reviewed and edited the cards before giving them to a student for input. While the clerk proofread the cards against the computer file, the author was still responsible for the final editing process, maintenance of the authority files, and actual production and distribution of the index.

One of the big advantages of this method of newspaper indexing is that it is a procedure that can easily be adapted for use with most any word processing software. Thus, if a library already has a microcomputer and word processing software, it has the basics for setting up a computer-produced newspaper index. It does work, and it works well.

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Selection of an Automated Library System for the University of Wisconsin Cluster Libraries

Philip Schwarz

In 1985 the University of Wisconsin System selected an automated library system to be installed in the university cluster libraries. A description of this process, including the background leading up to the decision to acquire an automated system, the development of the Request for Proposal, and the selection process itself are reported. Included in the appendixes are a chronology of events, a chart depicting the major players in the events, a checklist of activities used in setting up vendor demonstrations, and some additional suggestions for those undertaking such a venture.

BACKGROUND

The System

The University of Wisconsin System is one of the largest university systems in the United States. It was formed in 1971 by merging University of Wisconsin institutions with those of the former Wisconsin State University. The merged system currently has an enrollment in excess of 180,000 students at twenty-six campuses. It comprises two comprehensive universities offering degrees through the doctoral level (referred to as the doctoral cluster); eleven four-year, baccalaureate-granting universities with masters' and specialists' programs (referred to as the university cluster); thirteen two-year liberal arts institutions offering the A.A/A.S. degree (referred to as the university centers); and statewide extension.

The emphasis in this paper is on the eleven university cluster institutions, which include Eau Claire, Green Bay, La Crosse, Oshkosh, Parkside, Platteville, River Falls, Stevens Point, Stout (Menomonie), Superior, and Whitewater. The enrollments (1984) range from a high of approximately 11,000 to a low of slightly more than 2,000. Library collections range from 165,000 to 400,000 titles.[1]

Status of Library Automation

The online era of library automation in UW System libraries began with three developments in 1975. Six of the academic libraries in the state banded together under the auspices of the Council of Wisconsin Libraries (COWL) to join Ohio College Library Center (OCLC). Their objectives were to improve resource sharing in the region and to create machine-readable databases. The latter activity laid the necessary foundation for undertaking the project described in this paper.

Concurrently, UW-Oshkosh acquired a CLSI LIBS 100 circulation system. It was the first automated turnkey system in the state. At about the same time UW-Madison, the University of Chicago, and IBM began discussions regarding a joint venture to develop an online catalog and circulation system for large academic li-

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braries. This later became the Network Library System (NLS). Unfortunately, after this auspicious beginning, library automation saw no new developments for several years.

It wasn't until 1979, when UW–Stout began planning for construction of a new library learning center, that automation activity was renewed. UW-Stout received state funding for an automated library system as part of its building program. An invitation was extended to three other West Central Wisconsin Consortium (WCWC) libraries (Eau Claire, La Crosse, and River Falls) to participate in a joint venture to acquire a shared system. A Request for Proposal (RFP) was issued in 1980 for an online catalog and circulation system. A vendor was selected in early 1981, but because of funding difficulties only UW-Stout was able to proceed with implementation. In spring 1982 UW-Stout acquired a Data Phase ALIS II system.

Systemwide Library Automation Funding

About this same time plans were progressing to prepare a biennial budget request for library automation. This request was included as a line item in the 1983–85 request submitted by the UW System and was approved by the appropriate university and legislative bodies. A total appropriation of $2.6 million was approved for library cooperative resource-sharing purposes. Approximately $.8 million was earmarked for the NLS project, leaving $1.8 million to be spent for automating the Cluster libraries.

The approval of funding for library automation led Robert O'Neil, then UW System president, to appoint a systemwide task force on library automation, which was charged with advising "on the many steps that should be taken to develop and implement a System plan for investments in automated systems for UW libraries."[2] (See appendix A for a chronology of events.) Membership on the task force, which held its first meeting on May 13, 1983, included five academic administrators, one computer-center director, and four library directors.

The initial task force meetings were taken up with identifying goals and possible models for library automation in the UW System. Several models emerged. Among these were (1) a centralized model with all library automation supported by a single large computer center; (2) a modified centralized model in which the online catalog would be supported by a single central computer center and other automated functions by computer centers located on each campus; (3) consortial centralization in which a number of regional computing centers would be established to support library automation with links between each of the centers; and (4) complete decentralization in which each institution would have full control of, and responsibility for, its own automated system. These and other options were examined in the ensuing six months.

In November 1983 the task force issued an "Interim Progress Report,"[3] which identified the goals and objectives to be accomplished by library automation, reviewed the status of library automation as it related to the system, and defined a program of continuing activities for itself. The first priority identified by the task force was to establish at each campus an integrated, automated library system and to encourage campuses to work cooperatively to establish a shared system or systems. Each campus library system should include the following components, to be phased in over a period of time:

a. Circulation
b. Online Catalog
c. Acquisitions
d. Serials
e. Management Information

The report also recommended that the task force select and work with consultants to obtain advice on multiinstitutional/multilibrary automated systems in order that plans can be developed for the implementation of integrated, automated library systems at the institutions in the UW System.

The task force selected Joe Matthews, Ward Shaw, and Edwin Brownrigg as consultants and met with them in November 1983. Specifically, they were asked to make a formal presentation on the state of library automation as it related to the UW System, review the NLS project and evaluate its potential for use by other UW libraries, and

critique the interim report issued by the task force. The consultants subsequently issued a written report, which recommended that the system "issue a Request for Proposal for a turnkey automated library system," which should be installed in all of the cluster libraries.[4] The task force accepted this recommendation and immediately began planning for the drafting and issuance of an RFP.

DEVELOPMENT OF THE RFP

The task force met on January 18, 1984, to review the draft consultants' report. They agreed that a single RFP should be written to cover all of the cluster libraries, and an RFP team was appointed to prepare the initial draft. The task force also requested that the author serve as a consultant to the RFP team.

The task force had established a short time frame for the RFP team to complete its work. The goal of the initial team meeting, which occurred at Parkside during the first week of February, was to develop a first draft of the functional sections of the RFP.

The initial hours of the first session were spent identifying issues that had to be addressed before the actual drafting of a document could proceed. These included the strategy used in completing the task, the subsystems to be included in the RFP, the format and detail of the document, and the evaluation methodology. The team was working within several constraints established by the task force. This was to be a focused RFP; that is, several decisions had already been made regarding the type of responses that would be expected. First, it should specify an integrated system consisting of an online catalog, acquisitions, and circulation and serials control. Second, it should specify a stand-alone computer system for each of the eleven cluster libraries. Individual libraries would retain the prerogative of developing joint ventures if they so wished.

The approach selected in preparing the initial draft was to cut and paste from several existing documents. The consultant had collected copies of a number of RFPs prepared by other libraries. These were reviewed, and several of them were selected as possible models. In addition, the host library had already begun developing an RFP and had entered it into a word processor. In an attempt to expedite the drafting process, this document and its format were used as a starting point. The team had to rework all of the specifications to make them more general and to emphasize the importance of flexibility in the potential system. The latter was particularly important because it would be installed in eleven libraries with varied philosophies and practices. The team had considerable difficulty agreeing upon an evaluation procedure—in the end, the evaluation procedure and instrument were set aside to be developed at a later date.

Three days and two evenings were spent debating, cutting, and pasting the initial draft. At the end of the third day the team members were exhausted and felt they could not continue with any degree of productivity. The resulting draft RFP consisted of specifications for an online catalog (including cataloging); circulation control; and acquisitions subsystems. (The team hoped no one would notice that specifications for several of the required subsystems were missing!) The initial work was placed in the word processor to be revised several times before it was made available for public scrutiny.

The next step involved additional librarians from around the UW System. It should be pointed out that several of the university cluster libraries were already involved in drafting their own RFPs for automation systems even though none of these had been sent to vendors. The RFP team wanted to take advantage of expertise available in the system and to broaden support for the systemwide effort. The draft RFP was sent to all library directors in the system to share with their staffs. Written comments were solicited from each library. These were reviewed by the RFP team and grouped according to the appropriate RFP section.

In late March library directors from each campus were invited to attend a two-day meeting in Madison. The purposes were to meet with the task force and to review both its progress to date and the RFP. Each director was asked to bring "one technical staff member" to assist in reviewing the RFP and the comments received from the other libraries. These meetings were set to coincide with a regular meeting of the vice-

chancellors from each campus, making it possible to provide librarians and chief academic officers with a progress report for each campus at the same time.

Having received a task force progress report, attendees discussed activities surrounding the development of the RFP. After the initial overview sessions, they broke up into subgroups roughly corresponding to the subsections of the RFP. These included hardware and telecommunications, circulation, online catalog, acquisitions, and serials. A member of the task force chaired each subgroup, which met for a day and a half to review the draft RFP. At a concluding general session each of the chairs provided a report describing each subgroup's progress and answered questions from the audience.

Several benefits were derived from these sessions. Clearly, it gave additional people an opportunity to participate in the development of the RFP—many excellent comments were received and incorporated into later drafts. The participants in these sessions identified a need for serials and materials booking subsystems, and some of them later, during the selection process, became the nucleus of the evaluation team.

The RFP team was directed to incorporate the many changes suggested in the review sessions and to draft specifications for serials and materials booking subsystems. In addition, a general consensus was reached regarding the evaluation process and the relative importance of the various specifications in the RFP. While this was taking place, the consultant and the UW System purchasing department were drafting the introductory sections of the RFP. Several drafts (eight to be exact) and several threats of resignation later, the RFP emerged from the word processing center in a final form. It was sent to over thirty vendors on July 2, 1984. Additional observations regarding each stage of the process are found in appendix D.

PLANNING THE SELECTION PROCESS

Once the task force made its decision to select a single vendor for all of the university cluster libraries, the next step was the development of an overall plan for selecting the system. As mentioned earlier, the author was brought in as a consultant on the project. During late December and early January a member of the task force and the consultant developed a preliminary list of tasks involved in the selection process. A general approach to the process, including the players that would be involved, was also developed.

As the overall plan evolved, it came to include the following active players: the consultant, UW System staff, the evaluation teams' chairs and members (see appendix B). The consultant's role was to develop the overall plan and coordinate the selection process. System staff were involved in working with the consultant to facilitate the selection, assisting in preparation of materials after each phase of the project, and developing the detailed cost analyses that would be required. The consultant and system staff became known as the System Coordinating Group. The actual evaluation was carried out by forming five evaluation teams—for hardware (including operating systems, vendor support, corporate background, and telecommunications); online catalog (including materials booking); circulation; acquisitions; and serials—each coordinated by a chair. The team chairs acted as a steering committee, which made the major policy and procedural decisions during the selection process. They were also responsible for making the final recommendations at each stage of the project, including the final recommendations to the task force. Each evaluation team consisted of from four to six members with expertise in the appropriate areas. Although there was concern that such a large group would be unwieldy, it was paramount that each institution have at least one person involved in the selection process—in all, approximately thirty people were actively involved.

Once the tasks and participants were identified, the consultant assigned an estimated completion time for each task and developed a PERT chart showing the relationship between the various tasks and the estimated total elapsed time for completing the project. It quickly became clear that steps would have to be taken to shorten the time required for the selection process if it

was to be completed within an acceptable time frame.

Several steps were taken to reduce the projected schedule. First, only a general evaluation plan was included in the RFP: it indicated the overall approach to be used and the relative importance of each RFP section. The actual evaluation instrument was developed after the RFP was sent to the vendors and before their responses were received. This saved a considerable amount of time because it allowed two major tasks, the preparation of the vendor responses and the development of the evaluation instruments, to take place simultaneously.

A second step taken to reduce the schedule was to provide more structure to the process. This was done by establishing a time for the evaluation at a location away from the team members' normal working environments and associated distractions. Blocks of time were set aside for the initial review of the vendors' responses and demonstrations. This insured that each team member had uninterrupted time to review the appropriate materials and also helped insure that the expected outcome of each phase of the evaluation process was completed as scheduled.

The target date for the final selection was the first week in April, and the contract negotiations were to be completed by the first week of June 1985.

VENDOR CONFERENCE

A meeting of interested vendors was scheduled for August 3, 1984: attendance by all vendors interested in proposing was required. The purpose of this meeting was to clarify potential vendors' administrative and technical questions regarding the RFP and the selection process. In addition, vendors were given the opportunity to view the initial installation site at UW–Eau Claire.

The meeting began with a general review of activities leading up to the vendor conference. The floor was then opened to vendors' questions, and two hours were given to responding. Most questions centered on administrative details, and there were a few requests for additional information regarding the functional sections of the RFP. Although the meeting provided an opportunity for the system to clarify the intent of the RFP, a number of questions could not be resolved immediately and required that the consultant and the system purchasing officer examine the issues in more detail.

After the question-and-answer session the vendor representatives were given an opportunity to tour the UW–Eau Claire library and were provided with additional information regarding the projected location of the computer facility and terminal distribution.

Unfortunately the vendor meeting occurred just prior to a holiday, so that it was two weeks before all of the issues raised at the vendor conference could be clarified in writing and the additional information gathered. During this time the consultant and system purchasing officer prepared a written response to all of the questions and because of the delay, the due date for vendor proposals was extended from September 14 to September 28.

DEVELOPMENT OF THE EVALUATION INSTRUMENT

As mentioned earlier, the evaluation instrument was not developed along with the RFP for several reasons. There was disagreement regarding the design of the instrument and the approach to be used in the evaluation process. In addition, the evaluation teams were not named in time to complete work on the instrument before sending the RFP to the vendors.

The team chairs met on July 10 to review the selection process and to establish a timetable for completing the evaluation instrument. Agreement was reached earlier regarding the relative importance of the various specifications in the RFP. The actual method of implementing this decision was to allocate 10,000 total points to the evaluation process, distributed in the following manner: 3,000, online catalog; 2,500, hardware; 2,000, circulation; 1,000, acquisitions; 1,000, serials; and 500, materials booking.

Vendors were asked to respond to each functional specification in terms of whether it was available, available with minor differences, in testing, planned, or not planned. The chairs decided that evaluation points would be awarded and as-

signed to the appropriate category. In addition, a decision was reached to use only points assigned to the first two categories in the cost-performance analysis. In the case of hardware, points would only be awarded for operational equipment.

The second major component of the evaluation was the analysis of costs. Since the selection was for eleven systems, all with differing requirements, the team chairs asked the vendors to respond to a model configuration with information that included equipment required, collection size, number of patrons, and estimated transaction loads. It was felt that this approach would simplify the selection process.

Each of the team chairs subsequently established meetings with their members to determine how team points would be assigned. They were assisted by the fact that the published RFP contained evaluation weights after each specification. Each of the teams approached point allocations in slightly different ways—several assigned points in a very detailed fashion while others assigned them to major functional areas.

Prior to the date when the vendors were scheduled to return their responses, the evaluation teams completed their work, and a description of the evaluation process and instrument was provided to the Department of Administration.

CERTIFICATION

On September 28 the System Purchasing Office received nine proposals, each of which passed through a multiple-stage certification process. The purpose of this process was to insure that vendors receiving further consideration met established minimum standards. The initial certification review was conducted by System Purchasing—its intent was to certify that vendor proposals were received by the deadline established in the RFP and to insure that the appropriate material had been submitted.

The next several stages of the certification process were carried out by a committee consisting of the team chairs and the UW System Coordinating Group.

The RFP required that thirty copies of each vendor response be provided. This enabled each member of the evaluation team to have a set of responses and greatly facilitated the evaluation process. The size of the task quickly became evident when all of the proposals were gathered in a single room. All told, there were 270 copies of proposals to be sorted and collated—the logistics of this stage of the evaluation was a major task in itself. All of the boxes had to be opened and each vendor's proposal examined to determine if the appropriate number of copies as well as supplementary materials referenced in the proposal were included. The task of unpacking and collating the proposals took several person-days to accomplish.

A second stage involved the certification of the mandatory requirements contained in the RFP: vendors not meeting mandatory criteria would be eliminated from further consideration. Because the RFP contained mandatory elements within both procedural and functional specifications, vendors not having specific software features available would also be eliminated. Several vendors were able to meet all mandatory requirements for one or more subsystems; unfortunately, none were able to meet all of the mandatory requirements. This resulted in the team chairs accepting a fallback position in which all of the mandatory functional requirements were reclassified to "highly desirable," the next highest category.

A third stage of the certification review process established whether or not the vendor responded in the requested fashion. Basically, this required a response to each of the points in the RFP in the order in which they were listed, including a description of how the task was accomplished. It was important that each vendor provide detailed written responses because the next phase of the evaluation process was reading the proposals. The team chairs felt that it would be inappropriate to reward vendors who provided little detail in their responses by moving them to the next stage of the process. It was also their feeling that a vendor who could not provide a detailed response probably did not have the staff to undertake a project the size of the UW System cluster libraries.

The fourth and final stage of the certifi-

cation process examined the corporate background and customer base of each vendor. Specifically, it attempted to determine if the vendor was well established by noting the number of existing customers, customers added within the last year, and academic libraries in the customer base. It was important in a project of this magnitude that only established vendors with considerable corporate resources be passed onto the entire evaluation team for review. This phase of the review resulted in the elimination of four vendors.

The remaining responses were repackaged so that each evaluation team member received a complete set of materials. This effort took several person-days of work. The end result was that each member of the evaluation team received the equivalent of two Xerox boxes of material; these materials were stored for subsequent shipment to a local motel where the entire evaluation team was scheduled to gather the following week for the next phase of the evaluation process.

TEAM REVIEW OF PROPOSALS

Once the team chairs had completed their certification of the proposals, the next step was to have each member of the evaluation team review the appropriate sections of the vendors' responses. All of the repackaged responses were shipped to a local motel because it was felt that the evaluation process could be expedited if members of the team were removed from their work environments and associated distractions. The UW System's associate vice-president for Analysis Services and Information Systems sent a letter to each of the chancellors and library directors, indicating that the evaluation process would be a lengthy one and that it would require a major time commitment on the part of team members, who were assured the necessary released time to participate in the evaluation. They were housed at motels for the duration of this phase, and each was provided with a single room to insure privacy. Two review sessions were scheduled during the second and third weeks of October, and four days were set aside each week for team meetings. This schedule allowed team members to concentrate fully on the selection and still have a brief break to deal with emergency problems that arose at their respective offices.

On the first day of the evaluation process a general meeting was held for all of the participants, which was their first opportunity to meet as a group. The consultant provided an overall review of what had transpired prior to the meeting, and the various stages of the selection process were reviewed. Most importantly, each participant was given a detailed description of the individual commitment required during the evaluation process.

The purpose of this phase of the process was to review each vendor's response in detail. Each team approached this review in a slightly different fashion. Generally each team member read the appropriate section of all the proposals independently. In a second reading, each member completed the evaluation instrument, documented the reasons for high and low scores, and developed a list of questions regarding each vendor's proposal. Once all of the team members had completed the second step, the team met as a group to discuss its individual evaluations. The product of the group review was a single evaluation for each vendor, a documentation of the rationale for high and low scores, and a composite list of questions regarding each vendor's response.

As expected, the work load on the various teams was uneven. Several of the teams completed their initial review during the first week of evaluations. The acquisitions and serials teams completed their work rather quickly, largely because few vendors had operational subsystems available. The circulation team was also able to complete its work rather quickly because the responses were fairly straightforward. Several other teams required the full eight days to complete their review. The online catalog and hardware teams had the greatest amount of material to review and the most difficulty digesting the vendors' responses.

Once this stage was completed the raw composite team scores, the rationale for the scores, and the questions were submitted to the System Coordinating Group for compilation and analysis. This group consisted of the consultant, a research associate, and a

budget analyst. Several analyses were carried out for various hardware and software combinations. A preliminary cost analysis, covering initial and five-year costs, was conducted, and a preliminary cost/performance analysis was also developed. A composite list of questions and of strong and weak points was developed for each vendor. When these analyses were completed, the information was forwarded to the team chairs for review.

The team chairs and the System Coordinating Group met on November 1 to discuss the data gathered at that point. One day was spent reviewing the scores, costs, pros and cons, and unanswered questions resulting from this phase of the evaluation. After examining all of the data, the team chairs recommended that all of the remaining vendors be invited to demonstrate their systems. At that stage the point scores were relatively close and the cost analysis very tentative because of the large number of questions raised by the hardware team.

Following the review by the chairs, the consultant was charged with developing a revised composite list of questions for each vendor, which were sent with a request for a written response. The consultant was also charged with setting up demonstrations for each of the remaining vendors.

DEMONSTRATIONS

The vendor demonstrations were designed to help determine if the functions claimed to be available were in fact available and how well the vendor met each specification. In addition, these meetings allowed each evaluation team to clarify any unanswered questions and gain hands-on experience with each vendor's system.

The consultant developed a schedule for demonstrations between October and the end of December 1984. Team members were asked at the initial evaluation meeting to set aside five dates for vendor demonstrations, and each vendor was asked to devote four days to the evaluation effort. The first day was for setup, and the remaining three were allocated to the evaluation. The chairs felt this amount of time was required for several reasons. There was some uncertainty regarding the actual time that would be required, given the complexity of the RFP and evaluation instrument, and the number of unanswered questions regarding many of the proposals. In addition, there were approximately thirty evaluators traveling from throughout the state in the dead of a Wisconsin winter. It was important that the evaluations be completed in the allotted time frame to insure that staff and facilities were effectively utilized. Rather than risk the possibility of having to reschedule the sessions, it was felt that enough time should be allocated to cover emergency situations.

All of the demonstrations were scheduled at UW–Eau Claire, which was also the initial installation site. This provided all of the vendors with the same environment in which to demonstrate their systems; it also provided them with an opportunity to examine the site of the initial installation. The local arrangements coordinator at the test site library was able to refine the demonstration plan to a science. See appendix C for a copy of the checklist used in preparing for the demonstrations.

Vendors were asked to arrive on the day prior to the initial demonstration to set up and test their equipment. This allowed time to work out all of the "bugs" and, if necessary, fly in any new or replacement equipment prior to the beginning of the demonstrations. The normal run of technical problems included missing power cords, terminals damaged in shipment, and communication difficulties. One vendor arrived with a complete computer system and wasn't able to get it running until 11 p.m. on the evening prior to the demonstration. It turned out that the console was not plugged in! In every case the vendors were able to successfully demonstrate their systems without major equipment problems.

Each demonstration began with a general meeting of the evaluation team members that was used to deal with various housekeeping problems such as parking, room schedules, etc., and also to address any concerns or problems that had developed in the evaluation process.

This was followed by a general session in which each vendor provided an overview of its corporate background, available software, and future corporate developments. Questions of a general nature were raised at

this time. Each vendor also provided a brief demonstration of its online catalog—the most important subsystem in the evaluation process.

At the completion of the general session the teams broke up into their respective groups for concurrent sessions. In some cases this meant that the online catalog, circulation, hardware, serials, and acquisitions groups were all meeting at the same time. The vendor was required to provide at least one trained staff member to meet with each group and enough equipment to insure that each of the available subsystems could be demonstrated and evaluated concurrently. All groups except the hardware group had access to a terminal during the entire demonstration. Each team reviewed in detail each specification in the appropriate section(s) of the RFP. These meetings continued until each team's specifications had been reviewed and demonstrated and all of their questions had been answered by the vendor, who was given a break when the teams caucused to review scoring or discuss additional questions.

The demonstrations proved to be a learning experience for the team members and a rather grueling experience for the vendors. As noted above, each vendor was asked to devote four days to the evaluation process. Using the initial day for vendor setup avoided a number of problems and delays and allowed the subsequent evaluation schedule to be carried out without incident. Vendors had been asked to set aside three days for the actual evaluation, but they all required only two days and some evening sessions to demonstrate their systems to the satisfaction of the evaluation teams. The third day was originally scheduled for slippage in case of technical problems or inclement weather; it was actually used for demonstrating each vendor's system to those library directors who were not participating in the evaluation process.

At the conclusion of each demonstration each team revised its point scores on the basis of the information garnered and developed a list of strengths and weaknesses for each vendor's system. At the conclusion of the final demonstration each team reviewed all the scores to insure that points for similar capabilities or lack of capabilities and services had been assigned consistently among vendors. Each team then recompiled its scores and submitted them to the coordinating group.

Cost/Performance Analysis

The evaluation scores were then entered into spreadsheets for analysis. In general, the point scores did not differ a great deal from those submitted after the initial reading of the proposals—it appeared that the vendors were fairly accurate in their responses to the RFP.

In addition, a set of spreadsheets was also developed to assist in analyzing vendor costs over a five-year period. The coordinating group used the hardware team's evaluation of each vendor's hardware and operating system to identify the revised costs for configurations it felt would best meet the needs of the cluster libraries. In some cases this varied considerably from what the vendors had indicated in their responses to the RFP and to questions at the demonstrations.

In the time between the first and second cost analyses several concerns arose that prompted some additional data collection and analysis. In analyzing the evaluation points it became clear that vendors with the most subsystems were likely to have the highest point total; comparing vendors with a variety of combinations of subsystems proved to be like comparing the proverbial apples and oranges. The team chairs asked that an additional analysis be undertaken for comparing what they identified as the core system—the online catalog, circulation, and hardware. They felt this would provide a better comparison of vendors by emphasizing quality rather than quantity. Also, the first cost analysis was based upon the largest configuration in the system. Although similar configurations would be installed in several institutions, it was felt that a second, smaller configuration should be analyzed. This, in combination with the initial configuration, would provide a better overall picture of the projected costs. Therefore the costs for the two configurations were projected in order to estimate the total cost to the system if all eleven systems were installed. In addition, all of the strengths and concerns were compiled into a single document and all of

this information provided to the team chairs.

The team chairs then met to evaluate the information gathered to date, including the point and cost analyses, unanswered questions, and results of phone interviews with customers. The point totals had not changed appreciably as a result of the vendor demonstrations; the costs, on the other hand, had changed significantly: the least costly vendor in the initial analysis had become the most costly one. The cost changes resulted from several factors. The initial analysis was developed using data provided by the vendors in their original proposals for hardware and software configurations—in most cases, the systems were undersized. The revised cost analysis was based upon hardware reconfigurations resulting from discussions with all vendors and their customers. In addition, several of the vendors were able to offer revisions in their purchase and maintenance costs, and the maintenance costs projected over five years had a significant impact on the total costs for each system. The revised cost analysis also reflected a mix of systems more closely resembling the actual mix of configurations that would be required for implementation in all the libraries. This analysis rewarded those vendors with a wider range of hardware.

The final step was to develop a cost/performance ratio for each vendor. This was done by dividing total vendor points by total system costs, which had the effect of separating the vendors and resulted in a clear ranking. The chairs selected the two highest-ranked vendors for site visits, instructing the consultant to schedule multiple site visits for each of them.

SITE VISITS

Site visits were arranged to the headquarters of the two leading vendors as well as to two operational libraries. A site visitation team consisted of the team chairs, two system staff members, and a hardware specialist. An attempt was made to select sites that most closely paralleled future installations: libraries were matched in terms of size, hardware configurations, and operational subsystems.

The site visits were a key element in the evaluation process. They were intended to: (1) verify that the vendor's system was actually operational in a library environment; (2) secure answers to any outstanding questions; (3) assist in determining the impact of the system on library procedures, work flow, and staffing; and (4) assess customer satisfaction. The chief difficulty in scheduling these visits was finding sites that matched the profile of the larger cluster libraries. It was impossible to find operational sites with the same sized hardware and software configurations, and in the end, it was necessary to choose sites that most closely matched the cluster sites. The site visits were packed into one tightly scheduled week.

Prior to the site visits, extensive telephone interviews were conducted with libraries using each vendor's system. This information was combined with the results of earlier interviews and with that gathered by the evaluation teams. The result was a semistructured interview form that attempted to elicit information regarding the key concerns about each vendor.[5] The results of the interviews were particularly useful in that they helped establish patterns of vendor behavior regarding hardware configuration, software availability, and service.

The actual site visit conformed to a general pattern. Each of the libraries had been provided in advance with the names and responsibilities of the visitation team members, along with copies of the interview form. Each library could therefore gather the required information for responding to potential questions and/or have the appropriate staff available. A rough schedule of events was developed in conjunction with the contact person at each library: the usual pattern included a general session for discussing overall concerns followed by smaller group discussions between individual team members and their counterparts at the host institutions.

The site visits proved to be a valuable part of the evaluation process. All of the visited institutions gave extensively of their time and expertise, and there was a free and frank exchange of ideas between team members and staff. The site visits enabled the team members to focus on their major concerns: in the end, a clear consensus was reached regarding the vendor of choice, al-

though this did not become evident until the final selection meeting during the week after the site visits.

SELECTION OF THE WINNING VENDOR

Following the site visits, the team chairs, system staff, and hardware specialist met to make the final selection of a vendor.

Prior to the meeting each team chair had an opportunity to review the information gathered during the site visits—in several instances chairs conducted conference calls with their team members. The chairs provided the coordinating group with a summary of their findings, including any changes in the vendors' evaluation scores. The coordinating group revised the evaluation scores and the hardware configurations to reflect site-visit findings; this altered the cost analysis, which was updated. Only the two finalists' scores were compared, and they were not compared with the earlier scores of other vendors.

Chairs were given an opportunity to present their cases regarding the two vendors. System staff reviewed the revised cost analysis. Lengthy discussion followed each presentation. The consultant polled each team chair for his or her first choice of a vendor. The chairs unanimously recommended LS/2000, sold by OCLC.

System staff then began the task of summarizing the evaluation process and documenting the decisions made during each step of the lengthy selection process. This information, along with the final recommendations, was transmitted to the automation task force and to COWL. Both groups subsequently voted to support the recommendations of the evaluation team.

CONCLUDING OBSERVATIONS

The cooperative effort among System Administration, computer centers, and campus libraries and administrations in this automation project has been unprecedented in the annals of the UW System. Many hours were committed to the project by each campus, including the doctoral cluster, with little immediate self-interest in the outcome of the effort. This project was conceived and carried out without strong central control or leadership from a large central bureaucracy, thus continuing a tradition of accomplishment and innovation through cooperation.

There appear to be several key factors in the success of the project. One was the fact that the funds were held by System Administration until a vendor was selected, rather than being released to the individual campuses when available. This clearly provided an incentive to complete the process in a timely fashion: had the monies been released to the individual campuses, there would no doubt have been considerably less incentive to cooperate. In addition, the UW System had a strong tradition of decentralized cooperation—major efforts are more likely to develop from the bottom up rather than from the top down. Another factor was the existence of a strong group of academic librarians with a long tradition of cooperation. Last, but certainly not least, was the unselfish effort put forth by the participants in this process. They spent many weeks away from their normal duties, frequently driving lengthy distances in bitter cold and snowstorms to complete their appointed task.

The evaluation process provided an educational opportunity for the participants that would not have been available in any other setting. Members of the evaluation team were able to participate in the development of the ideal—the RFP—and see the reality—the vendor demonstrations. It was an eye-opening experience for most of the participants, who had never been involved in the selection of a large, automated system. The end result was the development of a cadre of librarians with a detailed knowledge of library automation. These librarians are now helping to implement LS/2000 on their individual campuses.

A potential disadvantage of selecting a single system for multiple campuses was that only a few from each campus were able to participate in the process. If each campus had selected its own system, more staff would have a greater understanding of the reality of automation and perhaps a greater commitment to the effort at the local level. This was recognized, and steps were taken immediately after the selection to have the vendor spend a day at individual campuses answering questions and

demonstrating the system to faculty and staff.

As this paper is being written the first library has just gone online with its public catalog and circulation and reserve systems. An additional four libraries are in various stages of installation, the last cluster library being scheduled for installation in summer 1988. The final evaluation of the success of this massive effort is some years away; in the meantime, the project is moving forward with all deliberate speed.

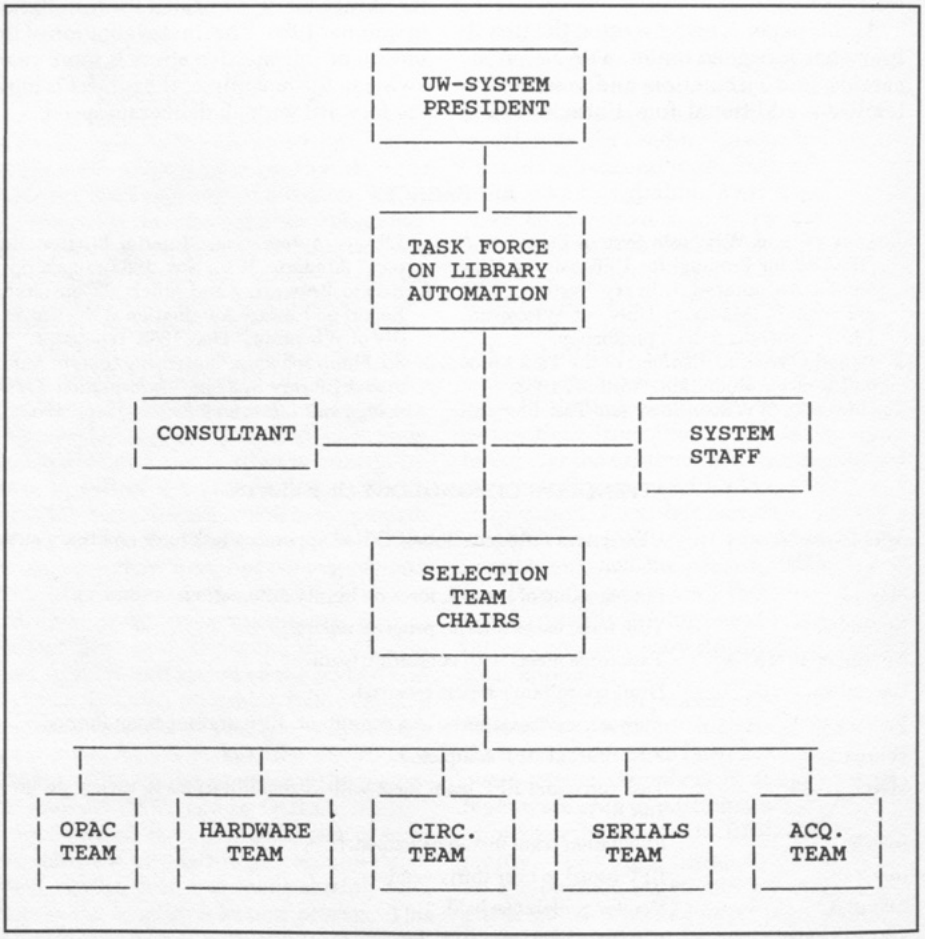
REFERENCES

1. University of Wisconsin System Purchasing, "Request for Proposal for University of Wisconsin Automated Library System: RFP #/TS-5800" (Madison: Univ. of Wisconsin, 1984), appendix 8.3.1., photocopy.
2. Robert O'Neil, to members of the Task Force on Library Automation, April 27, 1983.
3. University of Wisconsin System Task Force on Library Automation, "Interim Progress Report" (Madison, Wis.: Nov. 1983), typescript.
4. Edwin Brownrigg and others, "Consultant Report on Library Automation at the University of Wisconsin," Dec. 1983, typescript.
5. See Philip Schwarz, "Surveying Users of Automated Library Systems," *Information Technology and Libraries* 2:290–95 (Sept. 1983).

APPENDIX A. CHRONOLOGY OF EVENTS

April 27, 1983	UW System President Robert O'Neil appoints a task force on library automation.
May 13	First meeting of the task force on library automation.
November	Task force issues interim progress report.
November 17–18	Task force meets with consulting team.
December	Draft consultant's report received.
January 1984	Author's services secured as a consultant. RFP drafting team formed.
February	First draft of RFP completed.
March 27–28	Task force and RFP team meet with system librarians to review progress and RFP.
June 5	Evaluation team members named.
July 2	RFP issued to over thirty vendors.
August 3	Vendor conference held.
September 28	Vendor responses to RFP due.
October 2–3	Initial review of vendor responses by team chairs.
October 10–12, 16–19	Entire evaluation team reviews vendor proposals.
November 1	Team chairs recommend that five vendors be invited to demonstrate.
November 14–16, 27–29	Vendor demonstrations.
December 11–13, 18–20	
December 21, 1984–January 15, 1985	Christmas break.
January 15–17	Vendor demonstration.
January 31	Evaluation team chairs meet to select top two vendors.
February 18–22	Evaluation teams visit vendor sites.
February 27	Evaluation team chairs recommend LS/2000 be awarded contract.
March 14	UW System task force on library automation meets to review team chair recommendation.
March 19	Recommendation endorsed by Council of University of Wisconsin Libraries.

APPENDIX B. CHART OF PARTICIPANTS IN THE SELECTION PROCESS



APPENDIX C. VENDOR DEMONSTRATION CHECKLIST

Lodging

Room Reservations _____
Maps _____

Facility

Team Meeting Rooms Reserved _____
Demonstration Areas Reserved _____
General Meeting Room Reserved _____
Room Signs Made _____
Campus & Area Maps Made _____
Library Handbooks Available _____

Equipment

TV Monitor(s) Reserved _____
Jacks(s) Reserved _____
Chalkboard(s) and Flipchart(s) Reserved ____
Telephones Installed
General Meeting Room _____
Conference Room _____
Workroom _____
Extension Cords Reserved _____
Power Strips Reserved _____

Vendor Arrangements

Dates Confirmed _____
Campus & Area Maps Sent _____
Contact Made Regarding Equipment Delivery _____
Contact Made Regarding Hardware Needs _____

Evaluation Team Arrangements

Schedule and Agenda Sent _____
Campus and Area Maps Sent _____
Motel Information Sent _____
Parking Stickers and Map Sent _____
Restaurant Information Sent _____

Council of University of Wisconsin Librarians Arrangements

Letters of Notification Sent _____
Parking Stickers and Map Issued _____
Campus and Area Maps Sent _____
Restaurant Information Provided _____

APPENDIX D. ADDITIONAL OBSERVATIONS

Development of the RFP

- Drafting an RFP is a time-consuming process; enough time must be allowed for initial drafting, subsequent reviews, and redrafting.
- Released time should be provided for those drafting the RFP; this will allow them to concentrate on the task and not be distracted by daily work routines.
- Plan on working away from one's normal office environment; this will greatly facilitate the drafting process by providing uninterrupted work time.
- Use a relatively small group to draft the RFP; this will help expedite the process and insure a greater degree of consistency and writing style. It will also speed up the process of revising and editing the numerous drafts that will be required.
- There is no need to write from "scratch"—many other institutions have already drafted RFPs. Gather several of the better examples that meet your needs and work from them; contact the librarians who drafted and used these documents to find out what did and did not work for them.
- A general meeting of interested parties to review the RFP and discuss issues will facilitate and enhance the final product. Such a meeting will also allow additional staff to participate in the process, thus insuring their stake in the eventual decision.
- Develop a plan for the evaluation process and instrument along with the RFP; this will help insure that all three will work well together when the evaluation takes place.
- A decision should be made at the outset regarding whether the RFP will be focused or unfocused: in the former, the RFP asks potential vendors to propose solutions within certain constraints; in the latter, it identifies a general problem and asks vendors to propose a wide range of possible solutions. This decision will have a major impact upon the type and number of proposals received.
- Mandatory requirements, if included in the functional specifications, should be used judiciously. They should be of a general nature, e.g., the ability to load, display, and output full MARC records. Mandatory requirements focusing on minutiae run the risk of disrupting the evaluation process, particularly if the issuing agency feels that an unmet mandatory requirement results in the disqualification of a vendor.
- Use of mandatory requirements in terms of corporate background may be appropriate if the issuing agency does not wish to become involved in a research and development effort. If such is the case, the library should indicate that only those vendors with x number of existing customers or y number of new customers in the past year are qualified to respond. Clarification of this point will save both the vendor and the issuing agency a good deal of work.
- The amount of paper associated with the selection of an automated library system is staggering. As one vendor aptly put it, "for each piece of paper you send us we will send you two or three." Some vendors will attempt to confuse the process by providing large amounts of extraneous information. As a rule, if you don't want or need certain types of information, don't ask for it.

Planning

- Someone with experience (consultant) in library system selection should assist in developing the overall project plan. This will greatly facilitate the planning process and help insure that a realistic time line is developed. It is important to note that the selection of an automated library system is considerably more complex than the selection of computer systems typically acquired by academic institutions.
- The use of a PERT chart is an effecti· e tool for developing and communicating the overall plan to interested parties. Microcomputer versions of project planning software are available and relatively inexpensive.
- Provide enough slack time in the scheduling to account for possible problems. Don't back yourself into a hasty decision because of time constraints.
- A highly structured plan is very useful in assuring that tasks are completed on time.

- A core group should write the RFP, develop the instrument, and be involved in the evaluation; this will help insure a degree of continuity to the entire process.

Vendor Meeting

- Allow enough time for the vendor to read the RFP prior to the meeting; this will help insure that the vendor has an opportunity to identify any points of confusion.
- Inform each vendor that oral responses to questions provided at the vendor meeting are unofficial and that an official list of questions and responses will be provided in writing within several weeks; this will help insure that all issues are clarified and documented and that all vendors are working from the same assumptions.
- Use a stenographer or a tape recorder to document the proceedings; have the proceedings transcribed immediately after the meeting.
- Allow enough time between the date the vendor receives the written proceedings and the due date for the proposal; this will allow the vendor to prepare an adequate response.
- Decide ahead of time whether or not attendance at the vendor meeting should be mandatory.
- Provide copies of the proceedings to all vendors who received copies of the RFP; this will insure that everyone is informed of any possible changes in rules and conditions associated with it; it may also help protect the agency issuing the RFP from a possible lawsuit or challenges to the award.

Development of the Evaluation Instrument

- If a point system will be used as an evaluation technique, a decision must be made regarding whether points will be assigned to broad, general areas or to very specific functions; it is better to assign points to broad areas and thus give the evaluator slightly more flexibility in assigning points.
- The evaluation process involves determining not only whether a vendor can perform a certain function but also how well it can be performed. Some means must be built into the evaluation process for rewarding superior performance.
- The evaluation team should decide early in the process whether it will give the vendor credit for operational hardware or software only. There is a tendency to think of *operational* and *planned* as the same, when in fact they are markedly different; most vendors do little to clarify the differences.
- A policy should be established regarding the procedures to be used in addressing vendor requests for supplying updated information on their systems. What will be the policy if a vendor was rejected early in the process for not meeting certain conditions and later informs you that these conditions have now been met? Will you consider the new information, and if so, how will the vendor be reintegrated into the evaluation process?

Certification

- Have the proposals delivered to a location where they can be opened, examined, and repackaged with ease. Don't deliver them to a location from which they must be moved.
- Inventory materials as they arrive; this will help insure that all materials have been received from the vendor in the appropriate quantity.
- Staff to assist in the routine tasks of opening boxes and collating materials should be available at the delivery point.
- Supplies such as tape, box openers, and spare boxes should be available at the delivery point.
- Identification labels for each member of the evaluation team should be produced in sufficient quantities, so that they can be affixed to all copies of materials provided to team members.
- A record of the materials provided to each team member should be maintained; this will assist in gathering the materials for later return to the vendor or for destruction.

Team Review of Proposals

- It must be made clear at the outset that all information regarding the review process is highly confidential and should be treated as such; failure to observe this rule could result in serious legal problems.
- It is extremely important that each member of the evaluation team understand the time commitment required for evaluating automated library systems: one should talk in terms of months rather than days.
- Select evaluation team members who have a stake in the final decision; otherwise there is a high probability they will drop out of the process. This in turn places a heavy burden on the remaining participants and may place the entire process at risk.
- Select evaluation team members on their ability and commitment to hard work rather than on

their positions. Honorary members waste team time and place a heavy burden on the remaining participants.

- Isolating the team members into working groups provides an opportunity for them to develop a close working relationship and camaraderie that carries over into the remaining phases of the evaluation process.
- Isolating the teams and structuring the process also allows it to be completed in a timely fashion; a selection process involving a large number of people should be highly structured.
- Holding of all sessions in a single location will insure that materials will not have to be transported and constantly reboxed.
- Pick a location with adequate parking, recreational facilities, and ease of access.
- All participants should recognize that, at this stage, the various systems exist only on paper: the evaluators are essentially determining vendors' abilities to write a response rather than to produce an operational system.
- The cost figures resulting from the initial evaluation should be viewed with a degree of skepticism; costs can change dramatically during the remaining stages. The least costly vendor at this stage could easily become the most expensive in the end. At this stage the selection team should be concerned with selecting the best system without regard to cost.
- If the evaluation team is divided into subgroups, a much greater effort has to be made to insure adequate communication between them.

Demonstrations

- The vendor should be informed regarding the functions to be demonstrated. For example, records for nonbook media, manuscripts, etc. may not be included in the vendor's demonstration database; if these are to be included in the demonstration, the vendor should be notified in advance so that they can be incorporated into the database. Functions such as overdue notices and reports must also be set up in advance.
- If the library has a script for the vendor to follow it should be provided well ahead of time so that the vendor can set up the appropriate situations.
- Vendors should be informed that a quality demonstration on a clean database is required; unfortunately, the quality of the vendor demonstrations frequently leaves something to be desired. Sales representatives frequently work with demonstration databases that are used by the entire sales staff. As a result, many instances are likely to be encountered in which the demonstrator attempts to perform a function and finds that files have been changed, making it impossible to complete that portion of the demonstration. The evaluator may have only the salesperson's word that the function is operational.
- Vendor sales representatives need to be better prepared; in too many cases they are unfamiliar with their own systems. Most demonstrations proceed smoothly until vendors are asked to digress from their prepared scripts.
- A major risk is the possibility that the vendor with the best cost/performance ratio is the vendor with a proposal that is less than adequate but very inexpensive. The library needs to protect itself against such a possibility: perform a cost/performance ratio only on those vendors ranking highest in the final performance analysis, regardless of cost.
- In looking for integrated systems it is possible that a vendor with an inferior system may have more operational subsystems and thus garner more points than one with a superior system but fewer subsystems. It may be necessary to decide which is more important: fewer functions of a high caliber or more functions of a lower caliber.
- Vendors should be asked to access a "live" library database whenever possible; this is particularly important when viewing online catalog demonstrations. The way data are sorted and displayed does not always become obvious in a small database.
- Demonstrations should be conducted at a site with adequate parking, access to the meeting rooms for moving equipment and evaluation materials, storage for materials between sessions, and meeting facilities.
- Use of a single location for demonstrations will make it easier on all concerned and provide the vendors an equal opportunity to demonstrate their systems.

Site Visits

- It is extremely important that members of the evaluation team visit vendor sites. This is perhaps the most useful and informative part of the evaluation process, which is an academic exercise until the system is actually viewed in an operational environment.
- Prepare for the site visit: interview librarians working with the system beforehand; this will assist in identifying and documenting the strong and weak points for each vendor. Provide the host library

with a detailed list of the questions and major concerns so that they can be prepared to address them.

- Plan to spend an adequate amount of time at each site; it will probably take at least a full day.
- Select vendor sites that interviews show are exemplary and closely match the type of library and hardware configuration specified in the RFP.
- It is important not to be penny-wise and pound-foolish at this stage; if it is necessary to skimp, it should be done at another stage. Site visits are one of the most useful parts of the evaluation process.
- Arrange site visits to the top three vendors at least; this will provide a wide range of final options and will help avoid situations where one vendor looks "bad" and the other wins by default.
- Plan on visiting at least three sites for each vendor; every vendor has problems, and if one believes in Murphy's law, things will likely go wrong with the system when visitors are scheduled. Scheduling several site visits will put the odds in your favor.
- Attempt to establish costs over a five-year period. The vendor with the least costly system in year one could easily be the most costly after five years.
- Large libraries should be aware that it is sometimes difficult to find operational integrated systems of comparable size; this may make it difficult to evaluate a vendor's proposal. ■■

Communications

Automation of a Technical Information Center's Functions

Lynda S. Kuntz

This article covers the automation of functions in a technical information center. Using commercial software, a microcomputer-integrated library system (MILS) was developed by the library staff. The system provides access, query, input, edit, and report generation capabilities. It is completely menu-driven from the time the computer is turned on, and the opening menu allows the user to select MILS, WordStar, or various remote databases.

The Technical Information Center at the U.S. Army Concepts Analysis Agency (CAA) is automating various library functions using microcomputers and commercial software. The center now has integrated the acquisition, cataloging, public catalog, serials control, and circulation subsystems. Other functions such as accessing remote databases for cataloging input, information retrieval, interlibrary loans, and electronic mail have also been included in the project, which began in 1985.

CAA is a field operating agency assigned to the director of the Army Staff. The agency's mission includes analyses of broad issues in the areas of force structure, operational capabilities, resource requirements, and personnel and logistics processes. The Technical Information Center is a specialized library containing a small book collection (2,350 volumes); unclassified documents (3,000); classified (secret, top secret) documents (10,000); and technical journals (200 subscriptions).

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The automation of the center was not accomplished by procuring a commercial turnkey system for several reasons. The major drawback was lack of funding, and at the time few commercial systems were available for evaluation. In addition, the agency could provide technical assistance to the library staff for the development of an in-house system. Therefore, a microcomputer-integrated library system (MILS) was developed by the staff using the M300 workstation (OCLC's IBM PC) with an expansion chassis and four software packages: dBASE III Plus, WordStar, Microsoft Fortran Compiler, and PC-Talk. Other hardware includes a MicroSystems tape backup and a Hayes Smart Modem. The M300 was enhanced by the addition of an AST SuperPak that provides a clock and calendar and a speedup board that permits operation at almost IBM AT speed.

MILS facilitates building bibliographic databases, indexing for rapid access, maintaining and adding new records, searching databases, and producing reports. It was developed under the concepts of the alphabetical or inverted file and the relational nature of two or more databases. An accession number is assigned sequentially to each item as its bibliographic file is created. A keyword file is created for each word in the title and subject headings fields, and corresponding accession numbers are indexed. Finally, additional indexes are created for all remaining searchable fields. When a word is found in the indexes, the program locates its parent bibliographic record by the relationship of the accession numbers. (See figure 1 for an example of one book and its related files.) Retrieval features include the traditional approaches: author, title, and subject; in addition, MILS includes keyword and Boolean queries.

The design and development of MILS was accomplished one function at a time. To begin the online catalog using dBASE

THE FOLLOWING BIBLIOGRAPHIC CITATION:

L 901077 (ACCESSION NUMBER)
I DUPUY, R. ERNEST
N (AUTHOR)
E ENCYCLOPEDIA OF MILITARY HISTORY
A (TITLE WORD 1) (TI W 2) (TI W 3)
R HARPER
(PUBLISHER)
F 1985
I (YEAR)
L 1524
E (PAGINATION)
2ND REV. ED.
(EDITION STATEMENT)
0-06-181235-8
(ISBN)
355.009 DUP
(CALL NUMBER)
MILITARY HISTORY—DICTIONARIES. MILITARY ART AND SCIENCE—HISTORY—DICTIONARIES.
(SUBJECT HEADINGS)
DUPUY, TREVOR NEVITT, 1916–
(ADDED AUTHOR)

BASIC INDEX

ENCYCLOPEDIA	901077
MILITARY	901077
HISTORY	901077
MILITARY HISTORY DICTIONARIES	901077
MILITARY ART AND SCIENCE HISTORY DICTIONARIES	901077

ADDITIONAL INDEXES OF REMAINING SEARCHABLE FIELDS. THESE INDEXES ARE SEARCHED WITH PREFIXES.

AU = DEPUY, R. ERNEST	901077
PU = HARPER	901077
ISBN = 0-06-181235-8	901077

Fig. 1. Bibliographic Record and Related Indexes.

III (later upgraded to dBASE III Plus), a database of the most recent book acquisitions was created. The next step was the development of the acquisition and cataloging subsystem and its integration into the online catalog. For retrospective conversion, records were created by filling in the form provided by the program (see figure 2), which checks for some input errors at the time the record is created. There are two subsystems that process the information further: one checks for spelling errors, and the other creates the keyword-indexed records from the title and subject fields. Capacity is limited by the size of the fixed disk: the bibliographic record and its related files and indexes for 1,000 books required 1 Mb.

For current acquisition, the system allows for the building of a book record through the on-order, receipt, and cataloging functions, which provide for accounting of funds, production of receiving reports, and generation of the voucher registry (a Department of the Army requirement). After cataloging is complete the bibliographic information is transferred to the online catalog and run through the two subsystems mentioned above. The cost and vendor information is archived annually.

Searching the database is quick and easy.

```
LAST ACCESSION NUMBER USED: 901147
    NEXT ACCESSION NUMBER:                          ISBN:
IF REFERENCE COPY
INPUT REF
DEWEY CALL NUMBER
FIRST 3 LETTERS OF
AUTHOR'S LAST NAME
    AUTHOR:
    TITLE:
    EDITION:        PUBLISHER:        YEAR:        PAGINATION:
    SERIES:
    SUBJECT HEADINGS:
# OF COPIES:              TO EXIT, LEAVE SCREEN BLANK AND PRESS PG DN.
```

Fig. 2. Bibliographic Input for Books.

The user is prompted to select the field to be searched (see figure 3). MILS retrieves in the browse mode. That is, if the user inputs the author "Brown," the system will retrieve "Brown," "Browns," "Brownstein," etc. Whenever a single keyword search results in too many irrelevant records, Boolean searching is recommended. Retrieval is very rapid. A first find will be displayed in less than a second. If there are no finds, the system prompt reappears within a second for single-word search and within a minute for Boolean searches.

The serials control consists of input of periodicals as they are received, production of a weekly accessions list, and generation of cost and renewal reports. One can either input the expected receipt date from historical data or wait until the second year to implement the function of claiming for missing issues.

The circulation subsystem requires the input of personnel data whenever people join the organization. Items are checked out by their accession and copy number. The system creates a loan record containing the accession and copy numbers and the borrower's badge number. Overdues or notices of items loaned are generated by matching the accession number to the bibliographic record in the online catalog and the badge number for the individual's record in the personnel file. Check-in requires only that the accession number be entered and, if more than one copy, the appropriate record selected. The loan records are archived annually for collection usage and development analysis.

```
08/04/86
SELECT SEARCH APPROACH BY PRESSING LETTER IN <      >
                        <A>UTHOR SEARCH
                        <T>ITLE SEARCH
                        <S>UBJECT SEARCH
                        <D>TIC NUMBER SEARCH
                        <O>RGANIZATION OR PUBLISHER SEARCH
                        <R>EPORT NUMBER SEARCH
                        A<C>CESSION NUMBER SEARCH
                        <E>XIT TO MAIN MENU
SELECTION?
```

Fig. 3. MILS Searching Menu.

SELECT AN APPLICATION BY TYPING
A NUMBER, THEN PRESS THE <RETN> KEY:

1. INTERLIBRARY LOAN
2. CATALOGING ON OCLC
3. SEARCHING DTIC
4. SEARCHING DIALOG
5. WORDSTAR
6. MICROCOMPUTER INTEGRATED LIBRARY SYSTEM (MILS)
7. TAPE BACK UP
8. SEARCHING BRS
9. LOTUS 1-2-3
10. SEARCHING NEXIS
11. RETURN TO C>

YOUR CHOICE?

Fig. 4. Computer's Main Menu.

CAA is planning to have a local area network (LAN) linking the personal computers of all the departments within the agency; the MILS will be compatible with the LAN. In the meantime, floppy disks with the data and search programs are given to individuals for copying onto the IBM ATs; thereby individuals can search the library's holdings at their workstations.

As stated in the opening paragraph, other functions such as accessing remote databases have been enhanced in the automation project. When the computer is turned on, an opening menu (see figure 4) appears. The library staff member can select MILS, WordStar, or the various remote databases. To facilitate access to the remote databases, the function keys on the M300 were programmed to dial up the vendor, log on, and perform other system commands. This has proven to be especially helpful in accessing the Defense Technical Information Center's databases; this requires a three-step (37-character) sign-on, and all commands include bracketing with quotes, i.e., "end."

The automation of the Technical Information Center's functions has proven that commercial software packages can be used to develop an integrated library system and to facilitate the use of remote databases. The work of the library staff, combined with the crucial assistance provided by other CAA personnel, resulted in the in-house development of MILS. (We were thus able to avoid contractual problems with outside agencies.) The hardware and software costs have been less than for most turnkey systems, and the experiences gained in developing the system and in learning to program the PC have been professionally enhancing to the library staff. ■■

Subject Searching in an Online Catalog

Carolyn O. Frost

A survey conducted at the University of Houston examined students' use of the subject search in the library's online catalog. Students were asked about their frequency of subject search use, responses to subject search failures, reasons for infrequent or nonuse of the subject search, and preferences for catalog enhancements to improve subject searching. A majority of students were unaware of LCSH as the source of the catalog's subject terms. Findings of the study were largely consistent with those of previous research on catalog use.

This paper reports on one aspect of a larger study investigating student and faculty subject searching in a university online catalog. The research was conducted in

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May 1985 at the University of Houston–University Park (UH–UP) Library.[1]

A substantial number of studies have investigated the use of online catalogs, and much of this previous research has addressed the topic of subject access.[2] The study described in this paper offers an opportunity to add to the body of existing research and, in determining the extent to which these and related findings are consistent with those from earlier studies, to assist in the gradual emergence of an online catalog–use picture.

The findings of previous researchers have identified a number of subject-searching patterns and needs in online catalog use. Our study attempted to determine if these patterns were prevalent in student groups at UH–UP—a setting in which an online catalog providing subject access had been in operation for a year and a half.

RESEARCH DESIGN

Objectives

The overall objective of the research was to examine factors related to subject searching success in online catalogs. Questions addressed in the study thus included To what extent do users search by subject in the online catalog? What response occurs when a subject search is unsuccessful? What improvements to the subject-searching capabilities of the catalog would users most like to see? Why is the subject search not used by some patrons? To what extent are users aware of the catalog's source of subject terms?

Sample Population and Profile of Respondents

The eighty-one participants in the survey were invited to half-hour sessions that included the administration of a brief questionnaire surveying subject-searching use and the showing and evaluation of a slide-tape that demonstrated subject searching principles and the use of the Library of Congress Subject Headings List (LCSH).[3] The population for the study was limited to juniors, seniors, and graduate students, since freshmen and sophomores at this time had already been introduced to principles of subject searching as part of the library's user education program.

RESEARCH FINDINGS

Use of the Subject Search

Users' preference for searching by subject was one of the most surprising findings revealed in the twenty-nine library-wide surveys of online catalogs sponsored by the Council on Library Resources (CLR).[4] Our study revealed subject and title access to be almost equal in importance to users. About 59% of students reported using a title search always or frequently, while 54% reported such usage of the subject search. This finding is supported by preliminary analysis of data from UH–UP online catalog transaction tapes. In addition, we found that frequent users of the online catalog were likely to search frequently by subject (67%) and title (63%), and that almost half of the students who frequently search by subject also frequently search by title.

Previous research on card catalog use has suggested an inverse relationship between the level of subject-searching use and the level of academic education. Our findings support this to some extent. Graduate students were the least frequent users of the subject search. Perhaps related to this was the finding that juniors, the lowest academic rank in our study, were the least frequent users of the author search.

Response to Subject-Search Failure

Two questions in the survey were concerned with users' responses to a subject-search failure in the online catalog. Students were asked how they responded when they were unable to find what they wanted using a subject search. From the choices given, 38% said they would try an author or title approach. About a third said they would ask a librarian for help. Only 3% claimed that they would give up their searches.

A related question addressed students' responses to keying-in a subject heading that did not retrieve any items. This question was posed in part to see if students assumed that a zero hit rate indicated that the library had no materials on the subject requested. In fact, only 3% made such an assumption. Two response choices indicated some degree of willingness to try alternative terms: (1) "search under other terms

which might be used" (34%), and (2) "check to see if the Library uses another term for this subject" (15%). The response to the option of "check[ing] the same heading in the card catalog" (18%) indicates a limited degree of awareness that the online catalog contained only a partial listing of the library's holdings. Only 13% said that they would ask the librarian for help.

Preferred Enhancements for Subject Searching

To gauge users' preferences for catalog enhancements, various options for improvement of subject searching were presented for selection. Three preferences of almost equal importance emerged:

1. the capability to combine subject terms (32%).
2. the inclusion of a brief summary of the book's content in the catalog record (31%); Mandel suggests that this feature could be feasible with the cooperation of publishers.[5]
3. a feature for viewing a list of terms that the catalog uses as subject headings (30%); this enhancement is closely related to the one most frequently requested in CLR's nationwide study of online catalogs ("capability to view a list of words related to my search words").[6]

In the second tier of popularity were system features that suggest how to limit a search (25%) and to improve subject terminology: "subject headings would give a clearer description of what the book is about" (24%).

Slightly less popular were enhancements that suggest ways to expand a search (15%) and to provide a more exhaustive level of subject coverage (13%). Clearly unnecessary for most students was the improvement involving increased currency of subject terms (6%).

In a companion survey at the same university, faculty members were presented with a similar list of choices for improvement of subject searching in the catalog. Faculty members were in agreement with the student sample in listing their top three choices. The level of interest in some of the other enhancements was also remarkably similar to that indicated in the student responses. Almost exact matches of percentages occurred for the enhancements providing improved subject terminology, more exhaustive level of subject coverage, and increased currency of subject terms.

One area of difference between the two sample populations was in the enhancements that would have the catalog limit or expand the search. Faculty were more interested in being able to expand a search than to limit it, while the reverse was true for the students.[7]

Nonuse of Subject Searching

Students who said they seldom or never search by subject in the online catalog were asked to select from a list of possible reasons. Of these, a majority of students (69%) said that they usually found what they wanted by searching by author or title. Only 6% attributed their lack of use to a previously unsuccessful search, while 13% felt that they "probably wouldn't be able to think of what subject terms to search under."

Library of Congress Subject Headings as a Source of Subject Terms

In questionnaire surveys as well as in focused group interviews, research has revealed that, while users preferred searching by subject, they experienced substantive difficulties in identifying correct subject terms and in matching their terms with the catalog's language. At the same time, researchers found that, for a majority of users, the library's source of controlled subject headings remains intellectually inaccessible.[8]

Since previous studies have indicated that users are often unaware of the catalog's source of terms, we asked students in our survey what sources of terms could be used when searching the card and online catalogs by subject. Only thirty-two respondents (40%) indicated "only those terms listed in the Library of Congress Subject Headings."

SUMMARY AND CONCLUSIONS

This survey of online catalog use at UH–UP confirms findings from previous studies: a display of a list of terms that are related to their search terms would be highly attractive to users, but a large per-

centage of users are not aware of LCSH as a source of the catalog's subject terms. This finding suggests that present efforts to inform users of the shortcomings of the present online catalog systems are not sufficient to overcome some of the problems that such shortcomings pose to effective use of online systems. The burden of informing users of the limitations of the library catalog's subject-searching system will no doubt be lessened as the Library of Congress' release of its subject authorities tapes offers new hope for developing systems for online display of authorized terms.

REFERENCES AND NOTES

1. This research was made possible by a Faculty/Librarian Cooperative Research Grant provided by the Council on Library Resources. This study was conducted with the assistance of Kathleen Gunning, assistant director for Public Services and Collection Development, University of Houston–University Park Libraries.
2. A comprehensive recent survey of research on subject access in online catalogs can be found in Karen Markey's article "Subject-searching Experiences and Needs of Online Catalog Users: Implications for Library Classification," *Library Resources and Technical Services* 29:35–51 (Jan./Mar. 1985). See also Markey's book *Subject Searching in Library Catalogs: Before and after the Introduction of Online Catalogs* (Dublin, Ohio: OCLC Online Computer Library Center, 1984).
3. For a description of the slide-tape evaluation see Carolyn O. Frost, "Student and Faculty Subject Searching in a University Online Public Catalog: A Report to the Council on Library Resources," Aug. 1985, ED 264 872. A report of this aspect of the research project will appear in a forthcoming article.
4. Joseph R. Matthews, Gary S. Lawrence, and Douglas K. Ferguson, eds., *Using Online Catalogs: A Nationwide Survey* (New York: Neal-Schumann, 1983), p.144–45.
5. Carol A. Mandel, "Enriching the Library Catalog Record for Subject Access", *Library Resources & Technical Services* 29:5–15 (Jan./Mar. 1985), p. 13–14.
6. Markey, *Subject Searching in Library Catalogs*, p.87.
7. Frost, "Student and Faculty Subject Searching." A report on the survey of faculty catalog use will appear in a forthcoming article in the *Journal of Academic Librarianship*.
8. Steinberg and Metz found that only 28 percent of Virginia Tech catalog users were aware that subject searching is possible by using only LCSH terms. See David Steinberg and Paul Metz, "User Response to and Knowledge about an Online Catalog," *College & Research Libraries* 45:66–70 (Jan. 1984), p.69. Markey, in an analysis of access points entered by users of online catalogs at Syracuse, found that most access points could be categorized as "whatever popped into the searcher's mind," rather than terms or variants of terms found in LCSH. See Markey, *Subject Searching in Library Catalogs*, p.65–72. Pritchard's study showed that at the Library of Congress, half of the surveyed online catalog users answered that they had browsed randomly under words they knew. See Sarah M. Pritchard, "SCORPIO: A Study of Public Users of the Library of Congress Information System," (Washington, D.C.: Library of Congress, Jan. 1981), ED 198 801. ■■

News and Announcements

Libraries Move from OCLC to INNOVACQ

Winthrop College Library in South Carolina and Northeastern Illinois University Library in Chicago are the first to replace the OCLC serials and acquisitions subsystems with the INNOVACQ library system.

In both cases OCLC is facilitating the changeover by providing on tape the libraries' serials check-in data, entered when they were OCLC subsystem users. The transition from OCLC to INNOVACQ is immediate; ordering and check-in can begin on INNOVACQ the day after ceasing to use OCLC.

Both libraries are continuing to use the OCLC database as a source of bibliographic data for acquisitions and serials control. This data transfer is done electronically with an INNOVACQ online interface. ■■

Biblio-Techniques, Inc. Ceases Business Operations

Biblio-Techniques, vendor of BLIS, an online library catalog and integrated library system, has ceased business operations after six years.

The decision to conclude business was the result of a rapidly deteriorating financial condition. The corporation had sought major capital investment for some time to no avail. The board of directors has resolved to declare a condition of bankruptcy immediately.

Biblio-Techniques installed BLIS, Biblio-Techniques Library & Information System, in six major research libraries in North America as a vendor-maintained software system. During the last few months of business operations, customized BLIS source-code software was transferred to former customers who are taking over the maintenance responsibility for the local software.

BLIS was based on software produced by the Western Library Network and Software AG of North America, Inc. These two organizations offer direct software licensing worldwide.

For more information, contact Richard Woods, vice-president, (206) 352-4078. ■■

Georgia Tech Creates Library 2000

Library 2000, a project of the Georgia Institute of Technology Library, is aimed at creating a showcase library to demonstrate the application of the latest information technology in an academic and research environment. It uses an in-house computer and the campus network (GTNET) to distribute information to faculty in their offices and to students in the library, at terminal clusters on campus, and in dorm rooms.

The first step in creating Library 2000 is the distribution of online periodical databases to the campus. Georgia Tech is the first library in the nation to distribute four databases produced by Information Access Corporation (IAC) on an in-house computer and campus network.

The databases—*Magazine Index*, *Management Contents*, *Computer Index*, and *Trade and Industry Reports*—will be available to all students and faculty.

GTNET provides access to 8 mainframes and 40 minicomputers from 128 buildings on campus. Dial-up ports are used by research staff and faculty in locations off campus. Users access the systems through 3,000 personal computers, 135 microcomputers, and 700 terminals. The system is available twenty-four hours a day, seven days a week.

Library 2000 uses BRS/Search Software, a database package marketed by BRS Information Technologies for searching the IAC databases and the library's database.

The Georgia Tech database contains 350,000 MARC records describing the library's holdings of monographs, serials, government documents, and maps.

The BRS system has a message module to allow faculty and research staff to transmit requests for documents to the library; these are delivered to faculty and research offices twice each day through the library's Lends service. There are 14,500 students, faculty, and staff authorized to use the library's online information system.

The purchase of the databases was supported in part by a grant from the W.M. Keck Foundation. Online access to the databases will permit all students to learn the techniques of online searching and information finding. This availability supports Tech's project to increase information awareness on the campus.

Students and faculty use the BRS/Search system in "native" or command mode. Help is available online to those who need it. The library's database has been online since December 1985. ■■

IAC Introduces CD-ROM

Information Access Company (IAC) has introduced a new optical disk reference product that provides the contents of the company's *Magazine Index* database on CD-ROM for computer search and retrieval.

The new entry into the InfoTrac family of reference systems, called InfoTrac II, combines *Magazine Index* coverage for the current year, plus three back years, with three months of current indexing for the *New York Times*. In addition to searches by subject, users of InfoTrac II can search a list of indexed publications for specific titles. Articles contained in IAC's automated, microfilm full-text system, *Magazine Collection*, are indicated by an access code within the citation. Using InfoTrac II for citation searches, in combination with *Magazine Collection* for article delivery, patrons can perform independent bibliographic searches and full-text retrieval.

InfoTrac II presents significant enhancements to the original system for public libraries. The disk player is contained within the system's microcomputer, creating a stand-alone, single-user station equipped with monitor and printer. The entire system is contained in a security cradle to prevent theft or tampering with components.

With *Magazine Index/Plus*, users have access to issues of more than 400 general-interest publications covering the four most recent years as well as citations to *New York Times* articles for the most current six months. Monthly issues of CD-ROM disks deliver updated and fully cumulated data. Subscriptions to the full InfoTrac II system, including the microcomputer with built-in CD-ROM player, monitor, keyboard, printer, software, and twelve disk updates are $4,500 annually. The subscription includes all maintenance and customer service support.

Due to anticipated usage levels based on experience with the earlier systems, InfoTrac II will be dedicated to a single database. ■■

OCLC-developed CD-ROM Reference Package Tested at Vanderbilt University

Librarians and patrons at Vanderbilt University's Jean and Alexander Heard Library of Education are testing an OCLC prototype for a reference workstation that provides access to an education database, *Current Index to Journals in Education*. Stored on compact disk, the database contains more than 332,000 abstracts, with bibliographic citations from more than 750 education-related journals.

The OCLC CD-ROM reference package provides access to *CIJE (Current Index to Journals in Education)*, one of two databases comprising the ERIC (Educational Information Resources Center) reference database, which is funded by the National Institute of Education.

The OCLC test is part of the Enhanced Automation Project at Vanderbilt, a university-wide exploration of online access to journal information. The project is funded by a $750,000 grant from the Pew Memorial Trust. ■■

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Recent Publications

Book Reviews

Downloading Bibliographic Records. Ed. by John Foulkes. Aldershot, Eng. and Brookfield, Vt.: Gower, 1986. 72p. paper, $21 (ISBN 0-566-05014-5).

Editor John Foulkes presents the proceedings of a one-day MARC Users' Group seminar dealing with the new personal computer phenomenon of downloading or offloading bibliographic records. At the seminar, held in the United Kingdom, the issues relating to intended use, legality, and threats to the database producers were of major concern. Emphasis was also placed on benefits, technical and economic questions, protocols, software, and end-user problems.

It is important that the reader be aware that many of the concepts and techniques presented at the seminar are already in wide use by experienced personal computer users. In fact, new developments make some of the proposed or reported strategies archaic. The discussed and reported "general package" techniques for downloading bibliographic records result in editing and content control problems. This is because the downloading function is primarily accomplished as a screen or printer port-to-port transfer. Commercially developed "special packages" will soon be available. These will not only protect against misuse and include built-in communication software using LSP/OSI standards but will also provide full editing support as well as content transfer of the complete MARC-formatted record into an easy-to-use and affordable personal computer–based bibliographic database information system.

Whereas the one-day MARC Users' Group seminar primarily focused upon librarians' issues, the "special packages" will expand downloading opportunities into the novice and end-user's arena. Downloading will be accomplished in real time, as will the creation of author, title, subject, series, call number, and keyword indexes. These new end-user opportunities will heighten the concerns of the current database vendors. As a result, the discussed precautions for protecting fair use will surface in all sectors of the user community.

This short, well-summarized, 72-page publication is required reading for those interested in keeping abreast of the changing trends in today's high-tech library and bibliographic world. Of particular importance is chapter 4, "Attitudes to Downloading: Suppliers and Hosts." Supplier and host vendor concerns will be partially addressed by the essential, ongoing efforts of the library and information community to standardize communication protocols and system interfaces. These standards will help to facilitate information exchange *only* if the database vendors wholeheartedly subscribe. In order to subscribe, they will of necessity migrate from their preoccupation with protection against downloading of their databases as their sole source of revenue. Obviously, there must be protection against subsequent remarketing of downloaded data, which will require the inclusion of specific licensing agreements permitting users to extract data for their personal use but not for resale to any third party or for creation of competitive online databases.

End-users with personal computer proficiency who do their own programming will be able to develop homegrown software and procedures for accomplishing downloading and subsequent manipulation of bibliographic records. However, the full benefit of the personal computer will only be realized by using cost-effective, easy-to-use, commercially available soft-

ware for downloading and uploading. Uploading data into a vendor's host database, as opposed to downloading, will be the new service area that vendors will begin to develop and enhance in order to supplement their corporate revenue requirements. This type of commercially available software, which will include built-in communications software for downloading real-time bibliographic records as well as creating database indexes, together with built-in printer software for the preparation of special listing and dictionary catalogs, will also provide the ability to upload new or modified records to the host system. This new generation of bibliographic software will become a system requirement and an integral part of today's evolving library and information community. Likewise, it will provide import/export utility software for converting standard MARC-formatted communication data received from, or to be sent to, other organizations or individuals.—*Gordon W. Rawlins, The Pennsylvania State University Libraries, University Park.* ■■

End User Searching in the Health Sciences. Ed. by Sandra M. Wood, Ellen Brassil Horak, and Bonnie Snow. *Medical Reference Services Quarterly*, V.5, 1986, monographic supplement, no.2. New York and London: Haworth, 1986. 290p. paper, $29.95 (ISBN: 0-86656-465-9).

This volume is a useful collection of essays on an important and fast-changing area in the provision of information services. Librarians in health science libraries having or planning for end-user searching will find sections of this book invaluable. (Librarians in health science libraries who do *not* have or plan such programs should read this book and perhaps rethink their plans.) Other science librarians would be well advised to examine this collection and benefit from the experience of medical libraries in an area that will increasingly affect all parts of the library profession.

Medical librarians have for some time been in the vanguard of those applying new technologies to the provision of information services, in large part because of the visionary work by the National Library of Medicine that resulted in the early development of MEDLARS/MEDLINE and related databases. Perhaps more than any other library group, medical librarians have helped define issues and set the terms of debate concerning the developing library-information environment, though nonmedical librarians have not always been aware of or benefited from this. Searching of online databases by medical librarians has gone on for almost twenty years now, initially, and still in large part, using the MEDLINE file. Now, however, there are almost 200 bibliographic, factual and full-text databases related to biomedicine that are being used to support research, clinical work, and medical education.

Until recently, virtually all database searching in the health sciences has been "mediated," that is, carried out in libraries by librarians and information specialists for patrons. The papers collected in *End User Searching in the Health Sciences* address what many in the field expect will be the inevitable next phase of library information services, namely the widespread use of these databases—bibliographic and full-text—directly by the patron. (In fact, it has been the fear of some that such patrons will thereafter cease to be patrons at all and instead become off-site end-users.) According to the authors of this collection, a number of factors have combined to make end user searching a reality: efforts by database vendors to increase their markets by advertising to health professionals directly, the increasing availability of terminals and microcomputers, the development of user-friendly interfaces to the major databases and generalized "gateway" software, the growing number of computer literates and hobbyists in the health professions, and increasing awareness among researchers and practitioners of the speed and utility of online searching.

The sixteen essays in this collection, divided into three sections, cover the general environment of end-user searching in the health sciences, end-user searching programs at specific institutions, and the viewpoints of end-users themselves. Although many of the articles are of the "how we

done it good" variety, a few do attempt to go beyond and derive principles from the welter of practice. Winifred Sewell's opening overview does an excellent job of summarizing in a few pages the current state of affairs in medical end-user searching. She also includes her answer to the recurring, often anxiously posed question seen in much writing on this subject of what the future role of reference librarians will be if users do their own searching; according to Sewell, librarians will continue to do searches for the busy or unwilling, they will do especially difficult searches for end users, they will act as educators and consultants, and they will help develop better end-user systems.

Perhaps the most significant omission from Sewell's essay and, indeed, the entire collection, is the lack of any mention of the role of end-user searching in an IAIMS (Integrated Academic Information Management System) environment. A number of academic health science libraries that have received IAIMS development grants from NLM are even now wrestling with problems of developing local end-user interfaces and designing gateway systems for access to external databases. An article by Weise and Freiburger (University of Maryland Health Sciences Library) on mounting a local MEDLINE database addresses some of the issues raised by this particular application, but the general lack of reference to the developing IAIMS and scholarly workstation models must be considered a weakness in the collection.

Two articles on end-user training by Horak and Snow—as well as the five articles on institutional experiences in implementing end-user search facilities and training programs at Lane Medical Library (Stanford); Moody Medical Library (University of Texas Medical Branch–Galveston); University of Minnesota Bio-Medical Library; Massachusetts General Hospital; and University of Maryland Health Sciences Library—are generally informative and should prove helpful and practical to institutions having or planning such services. The Snow article, which reports on the 1985 MLA course "Designing Online Education for Medical End Users" seems particularly good, emphasizing the need for educational performance objectives and accepted teaching methodologies. An article by Bruce and McGowan on "personal information management," while containing some useful information, suffers from lack of clarity and shows little familiarity with the accepted terminology, concepts, and standards of systems analysis, system design, and database creation and management.

The third section, containing articles by and about actual end users (one of whom refuses to accept the designation), is interesting and, perhaps inevitably, inconclusive. From these articles and the others in the collection, it appears as though the jury is still out as to whether end-user searching will ultimately outstrip and replace mediated searching or will remain secondary to it. Most agree, however, that it will be a significant and growing segment of the information market.

The remainder of the book consists of an excellent, fifty-six page, annotated bibliography of articles on end-user searching, prepared by M. Sandra Wood (editor of *Medical Reference Services Quarterly* and one of the editors of this collection). The 175 articles listed appeared in some thirty journals, though chiefly in *National Online Meeting Proceedings*, *Online*, *ASIS Proceedings*, and *Medical Reference Services Quarterly*.—*Stephen Paul Davis, Augustus C. Long Health Sciences Library, Columbia University, New York, New York.* ■■

Essential Guide to CD-ROM. Ed. by Judith Paris Roth. Westport, Conn. and London: Meckler, 1985. 189p. paper, $29.95 (ISBN 0-88736-045-9).

CD-ROM (Compact Disc–Read Only Memory) is one of a variety of new optical (laser) storage media, including digital videodiscs, write-once discs, and erasable optical discs. CD-ROM has gained much attention as the optical technology most appropriate for publishing applications. It benefits in manufacturing from the economy of scale derived from its similarity to and shared production facilities with its sister product, the audio compact disc. Another benefit for publishers is that it is "read only" and thus protects the authenticity of

the content. When a CD-ROM player is used as a storage peripheral with a microcomputer, its data can be searched and printed locally or downloaded for local manipulation. Thus it is a much more flexible storage and retrieval mechanism than paper, microfilm, or microfiche, and it is more cost-effective than online search systems for information that needs to be updated quarterly or less often. It lends itself particularly to indexing/abstracting reference databases that have few graphic requirements.

Judith Paris Roth has set out to inform readers about the basic concepts and principles of CD-ROM technology as well as its hardware and software requirements, which are essential to understanding CD-ROM–based information systems. She also attempts to introduce the reader to the major firms now involved with developing this technology and how CD-ROM applies to the general field of information distribution. Generally she succeeds in these objectives, though the text often reads as if it is right out of product descriptions.

The text covers the key elements of CD-ROM technology: the basics of the laser recording and reading process, players and their interfaces to microcomputers, operating system software, file structures, applications software, premastering/mastering/stamping of the discs, and standards developments. It also includes a glossary of technical terms and acronyms and a directory of firms, organizations, and groups working with CD-ROM technology. Thus, the basic information is there. The book suffers, however, from a somewhat disjointed organization. The reader is constantly referred in the body of the book to standalone appendixes, instead of having that material incorporated into the main presentation. Much of the material has been supplied by the hardware and software vendors, with what appears to be very little editing. A significant portion of the text is reportorial in nature—devoted to descriptions of current vendors and their products—and will date quickly as this

technology continues to change rapidly. Some descriptions already are out-of-date. The editor reports some CD-ROM prototypes shown at professional exhibits or conferences as actual products, when in fact they were never actually marketed. This is a reflection of the heavy dependence by the editor on material supplied by the vendors.

The introductory chapter makes some effort to compare CD-ROM with digital videodiscs and erasable discs, though these comparisons are cursory at best. CD-I (Compact Disc Interactive) is not mentioned, having been announced in the marketplace after this volume was published. Thus, a reader who wants to understand CD-ROM technology as it compares to other optical technologies will not be satisfied with the comparison presented here.

Roth's book is one of the first in the marketplace to present a concise overview of the components of CD-ROM technology, and, as such, it is a useful addition to academic and large public libraries. It is a helpful starting point for those contemplating purchase or production of CD-ROM information products.—*Nancy L. Eaton, University of Vermont Libraries, Burlington.* ■■

Harter, Stephen P. *Online Information Retrieval: Concepts, Principles, and Techniques.* Library and Information Science Series. Orlando, Fla.: Academic, 1986. 259p. (ISBN 0-12-328455-4); paper, (ISBN 0-12-328456-2).

In the preface to this volume, the author states that he will relate "central concepts, principles, and techniques of information storage and retrieval to the practice of online searching, with the ultimate goal of helping the reader to learn *how to think about* online information retrieval." He directs his text at "students, practicing librarians, and information specialists who want to add to their knowledge and understanding of the process of online information retrieval and of issues related to this process." With the exception of the significant and unfortunate omission of end-user searching, he fulfills his stated purposes.

Harter presents the concepts behind the online process and immediately ties them to the daily practicalities of searching. For example, the chapter covering database structure also explains Boolean searching, proximity operators, and truncation. These meaty, practical principles of online searching are placed where they logically occur in a conceptual discussion of record and file structure, instead of appearing in their more common context of search-strategy formulation. At the end of each chapter he includes problems (but no answers) that encourage the reader to explore certain issues further or to apply the principles to particular databases or systems.

The book functions well as a practical guide to everyday online searching. Harter writes prose that is clear, direct, and easily readable without sacrificing the scholarliness that is evident throughout. He carefully defines all his terms (as well as including an extensive glossary), and he constantly reminds the reader of the scope of his work. On those occasions when he does not pursue a subject (and also on many occasions when he does), he refers the reader to materials for further study.

He makes excellent use of charts, tables and, most significantly, checklists. In this book, the checklists alone could be compiled for a helpful online guide. They specify when to use natural-language and controlled-vocabulary search terms and how to evaluate gateway systems and bibliographic or numeric databases as well as the steps in the online process, the personal characteristics of a successful online searcher, and the issues to address in the reference interview for an online search. Ever aware of online realities, Harter also includes exceptions to the principles of the checklists.

He reminds searchers to be thoughtful and self-evaluating and to avoid making assumptions. He encourages constant growth of the searcher; for example, he deplores the fact that many searchers have avoided the challenge and potential of numeric databases. His stated philosophy is that "the beginning searcher needs to build confidence and knowledge slowly and methodically by applying principles and concepts of information retrieval, problem solving skills, and a healthy attitude toward self-evaluation to the conduct of real searches.

In this way a set of useful personal heuristics will evolve, and the *art* of online searching on a personal level can begin to be developed."

Since he views online searching as art, it is not surprising, though quite disappointing, that Harter dismisses end-user searching with a cursory discussion. Throughout the previous chapters, the reader anticipates a discussion of end-user searching filled with helpful checklists and a clear discussion of the thorny issues and challenges raised by its growing popularity. Instead, Harter covers end-user searching in two pages and states that "This writer would argue the wisdom of leaving brain surgery to the brain surgeons, auto repair to the mechanics, and online searching to specialists in information storage and retrieval." This treatment of end-user searching is unfortunate in any online text and unacceptable in a library-school textbook purporting to discuss the issues of searching. End-users are here to stay, and many more are on the way—high school students are successfully performing their own searches on such complex "professional" systems as Dialog. Online searching is neither art nor brain surgery but rather one of the many ways of accessing information. End-user searching is changing the online role of librarians and information professionals, so that current and future librarians must address this trend and respond with positive actions and discussions.

Online Information Retrieval is a useful and practical manual for online collections, but it lacks a thorough discussion of end-user searching.—*Deborah A. Einhorn, University of Pennsylvania, Philadelphia.* ■■

Libraries and Information Science in the Electronic Age. Ed. by Hendrik Edelman. Samuel Lazerow Memorial Lectures, 1983–85. Philadelphia: ISI Pr., 1986. 177p. $39.95 (ISBN 0-89495-058-4).

Collected in this volume are the first twelve lectures in the series of Samuel Lazerow Memorial Lectures delivered by eminent librarians and information scientists at seven U.S. library schools between 1983

and 1985. This is an eclectic, nontechnical collection reflecting the great diversity of perspectives in the fields of library and information science. The volume also reflects, to some degree, differing levels of seriousness in preparing Samuel Lazerow Memorial Lectures.

Frederick G. Kilgour, in "Public Policy and National and International Networks," surveys the current status of public policy relevant to electronic information flow and concludes that public policy has not kept up with technology and is not likely to do so, except in governments characterized by centralized authority. Carlos A. Cuadra, in "The Coming Era of Local Electronic Libraries," reflects on the development of online databases, downloading, and the wide range of potentialities and problems inherent in the idea of the "local electronic library." In "Shifting Gears: Information Technology and the Academic Library," Richard De Gennaro develops the theme of a substantial and costly technological dimension being added to the traditional services of the academic library and the impact of that addition in the area of funding. Lillian M. Bradshaw discusses public-private partnerships as alternative sources of funding for public libraries. Carol A. Nemeyer provides a broad overview of the Library of Congress' services to the nation, and Toni Carbo Bearman takes a look at lifelong learning in the electronic age. Allen Kent contributes a highly personalized interpretation of the history of the library automation. In a wide-ranging paper, "The Challenge of the Emerging Information Society: Are We Ready?," Herbert B. Landau promotes the view that a "historical imperative" demands that librarians become media-independent information managers.

William Paisley's contribution, "The Convergence of Communication and Information Science," represents the most scholarly and substantive treatment in the collection. Paisley describes the development of various information science and communications subfields and presents empirical evidence documenting a trend toward convergence among them. He makes the following noteworthy observation: "Differences between the subfields of communication science are worth preserving. Their different concerns and foci have lead to distinctive theories and concepts. In a variable field like communication, theory is built by analogy rather than by reduction, which means that each subfield can be a source of new theoretical perspectives for the other subfields."

Papers by William O. Baker ("Modern Techniques Linking Knowledge to Action"); Lester Asheim ("Means and Ends in Librarianship"); and Glen C. Bacon ("Forces Shaping the New Information Paradigm") carry the most weight in terms of breadth of vision and quality of insight. Baker is retired chairman of the board of AT&T Bell Laboratories, Bacon was formerly director of the Corporate Technical Committee at IBM and is a frequent spokesman for IBM on technological directions, and Asheim is Kenan Professor Emeritus at the School of Library Science at the University of North Carolina at Chapel Hill. It is interesting, to this reviewer, that in this wide-ranging collection of perspectives on information science in the electronic age, the views of two corporate scientists and a librarian/humanist stand out for their sheer provocativeness.

This volume, ably edited by Hendrik Edelman, is a fitting memorial to Samuel Lazerow and is warmly recommended to librarians and information managers who are inclined, in their reflective moments, to indulge in thoughts about libraries and information science in the electronic age.—*Joe A. Hewitt, University of North Carolina, Chapel Hill.* ■■

Martin, Susan K. *Library Networks, 1986–87: Libraries in Partnership.* White Plains, N.Y. and London: Knowledge Industry, 1986. 252p. $36.50 (ISBN 0-86729-128-1); paper, $28.50 (ISBN 0-86729-127-3).

How does a NetWork?
Humpty Dumpty.

While one might wonder whether there were enough new developments to justify a fourth edition four years after the third, Susan Martin's descriptions and commentaries make it only too clear that the definitive work on networks and networking will probably never be written. Change is endemic.

The major changes of the past four years relate to three phenomena: the change in the role of the bibliographic utility, the pervasive uncertainty surrounding the regional networks, and the halting emergence of alternatives to both of these. Beyond them lies the still uncharted role of local consortia and large independent library systems. The author barely touches on the last issue, understandably enough given its complexity, but the next edition will have to do so.

In the mid-1980s the major unresolved questions revolve around the ownership of bibliographic data deposited with the utilities and the technical effects of distributed processing. The author clearly sets out the history of these issues but wisely refrains from predicting solutions. As she points out, both distributed processing and the copyright issue are raised directly by the Linked Systems Project, one of the most promising ventures of the decade. The mixture of politics, law, and technology is volatile, even explosive, and most librarians have been unwilling to think deeply about it.

That the regional networks and OCLC have been able to live for four years without new contracts suggests two things. First, the political issues are probably not going to be solved by direct action; rather, they will be overtaken by technical change. Second, unless the networks can change their roles substantially, their future may be severely limited.

In the chapters on "Nationwide Programs" and "The Private Sector," the author points out that alternatives to both the utilities and the networks are being developed. At this time their effects might be compared to "a cloud the size of a man's hand," but soon the floods will come. As she concludes, librarians are essentially pragmatic: "As more libraries adopt their own local systems, it may be particularly appealing to reconsider a major financial commitment to a network and replace it with private sector services instead." In fact, this process has already begun. OCLC has begun to develop and support local systems (LS2000); UTLAS has gone private; both are competing in the areas of network and system support. Vendors such as Data Research Associates are following the reverse path—creating their own networks—while AMIGOS and SOLINET offer some services similar to those developed by OCLC.

This blurring of the lines can be expected to accelerate. In 1990, as the author suggests, utilities and networks will still exist, but their roles will have changed radically. As more and more libraries install local systems, often shared ones, their ability to choose from a range of services will increase, benefiting those entrepreneurs who have been most adaptable.

The effect of the increasing numbers of local consortia is understated in this survey. There may still be some question as to whether they are in fact networks, but the probability is that, over the next few years, they will become indistinguishable from those now so designated. When, as in Massachusetts, the power of LSCA funds is directed towards encouraging electronic resource sharing, the balance of power shifts. If libraries join together to share catalogs and circulation systems, they also gain the power to handle interlibrary loan and to use one another's skills. Where, then, the national and regional networks? The author makes it clear that, for example, the rigidity of OCLC's pricing structure may severely damage its ability to respond.

On the first page the author refers to a definition of cooperation as "an unnatural act." This definition is based on the argument that what is good for the individual may not be good for the group. She cites several instances of this, the most clear being cost, copyright, and priorities. It is quite possible that most librarians are still seeing networks in preelectronic terms. While librarians support cooperation on principle, they have only now begun to understand the costs and the local implications of the networks' inherent rigidities. Given the choice, many would feel more comfortable with smaller local groups, where the much-vaunted but little-practiced resource sharing could actually have a chance to develop. The regional networks, for all their efforts to diversify, are basically still regional sales agencies for OCLC. This is the kind of monopoly this country has rejected, as in the case of Ma Bell, and it will be interesting to see whether it survives in the nonprofit sector.

The next few years will tell.

Given the centrality to libraries of the activities so well described in this book, it is indeed strange that more has not been written. Whether this suggests an uncritical acceptance of the existing structure or the difficulty of political analysis of things technical, the lack of research is bad for the profession and for libraries. Too little literature covers the financial management of the nonprofit sector as it is, and the technical literature is directed toward those problems as if they existed in a vacuum.

While this descriptive work cannot fill that gap, it certainly fills its stated purpose of describing electronic networking as it exists today. It is, as the author says, "almost impossible to describe the state of the art at any one moment." Even during the publishing process for this book, there have been major changes in the private sector. By the time the next edition is out, the changes will have become greater still. The price is rather steep for 174 pages of text, but there are also lists of network memberships (not readily available elsewhere) to round out the picture. A work of this kind requires the use of acronyms to avoid even greater repetition of word strings, but after a while, capitalizations jar the eye and dull the senses. Library managers need to read it, as background for making decisions, remembering the old aphorism about those who fail to read history being doomed to repeat it. Network managers should ponder deeply some of the issues raised.—*Murray S. Martin, Tufts University, Medford, Massachusetts.* ■■

Other Recent Receipts

Listed here are books and other publications received for review that are of potential interest to LITA members. Some of these materials may be reviewed in later issues of ITAL.

Beiser, Karl. *Essential Guide to dBase III + in Libraries.* Westport, Conn., and London: Meckler, 1987. 276p. paper, $19.95 (ISBN 0-88736-064-5). "Supplement to *Small Computers in Libraries*, no. 1."

Buckley, Jo Ann. *Essential Guide to the Library IBM PC. Volume 7: Database Management Systems.* Westport, Conn., and London: Meckler, 1986. 211p. spiral-bound, $19.95. (ISBN 0-88736-050-5).

Carter, Ruth C., ed. *The United States Newspaper Program: Cataloging Aspects.* New York and London: Haworth, 1986. 119p. $22.95 (ISBN 0-86656-576-0). "Also published as *Cataloging & Classification Quarterly*, Volume 6, Number 4, Summer 1986."

Craven, Timothy C. *String Indexing.* Library and Information Science Series. Orlando, Fla.: Academic, 1986. 246p. $29.95 (ISBN 0-12-195460-9).

Houston, James E., ed. *Thesaurus of ERIC Descriptors.* 11th ed. Phoenix, Ariz.: Oryx, 1986. 588p. $65 (ISBN 0-89774-159-5). "Developed under the auspices of the Educational Resources Information Center."

Kantor, Paul B. *Costs of Preservation Microfilming at Research Libraries: A Study of Four Institutions.* Washington, D.C.: Council on Library Resources, 1986. 32p. $3 prepaid.

Polly, Jean Armour. *Essential Guide to Apple Computers in Libraries. Volume 1. Public Technology: The Library Public Access Computer.* Westport, Conn., and London: Meckler, 1986. 169p. spiral-bound, $19.95 (ISBN 0-88736-049-1).

Rosenberg, Victor, and Gretchen Whitney, eds. *The Transfer of Scholarly, Scientific and Technical Information Between North and South America: Proceedings of a Conference.* Metuchen, N.J., and London: Scarecrow, 1986. 701p. (ISBN 0-8108-1935-X). From an April 1983 conference convened at the University of Michigan.

Sanders, Jo Shuchat, and Antonia Stone. *The Neuter Computer: Computers for Girls and Boys.* New York and London: Neal-Schuman, 1986. 279p. paper, $19.95 (ISBN 1-55570-006-3). "Developed by . . . the Women's Action Alliance."

Towell, Julie E., and Helen E. Sheppard, eds. *Computer & Telecommunications Acronyms.* 1st ed. Acronyms, Initialisms & Abbreviations Dictionary Subject Guide Series, v.1. Detroit: Gale, 1986. 391p. $60 (ISBN 0-8103-2491-1).

Walton, Robert A., and Nancy Taylor. *Directory of Microcomputer Software for Libraries.* Phoenix, Ariz.: Oryx, 1986. 564p. paper, $37 (ISBN 0-89774-342-3).

White, Herbert S., ed. *Education for Professional Librarians.* Professional Librarian Series. White Plains, N.Y., and London: Knowledge Industry, 1986. 287p. $36.50 (ISBN 0-86729-197-4); paper, $28.50 (ISBN 0-86729-196-6). ■■

Letters

To the editor:

I read with great interest Lois Mai Chan's article in the September 1986 issue. Her comments and suggestions are filled with professional insights and offer valuable suggestions for future end-user applications and implications in online systems.

I believe her discussion can be extended to the pre-user stage, specifically the cataloging/classification processes. Few catalogers have the vast grasp necessary to have a full understanding of LCC, DDC or LCSH. Within her discussion are embedded great possibilities for the cataloger who is struggling with appropriate subject headings and classification. The quality of online retrieval through classification is directly proportional to the quality of the classification chosen. Through the use of Boolean operators and known subject headings a cataloger can enter the online catalog and find similar works with the end results being more accurate subject headings and more precise classification.

While a graduate student in the School of Library and Information Science at the University of Illinois at Urbana-Champaign, I held a graduate assistantship in the University Library's copy cataloging section. I came in contact with DDC for the first time. I found the online catalog to hold great advantages for assigning subject headings and classifying. Pulling precise key words from titles and adding a known subject heading or key words combined with AND retrieved records that greatly assisted me in classifying and adding subject headings in areas of knowledge with which I was less experienced.

Furthermore, many areas of the classification schedules in both DDC and LCC can be confusing if not impenetrable. One specific example comes to mind: psychology versus psychiatry. Frequently the lines between the DDC 150's and 616.89's (or in LCC BF 1-990 and RC 321-569) are tremendously blurred. The intellectual approach, the academic credentials of the individual(s) responsible, the publisher, etc. for the work all may become the basis for the classification and/or subject headings. But inconsistency abounds in nearly all catalogs, including those at LC. With the use of Boolean operators in a system allowing combinations of free-text title searching with other titles, series, classification numbers, or subject headings, a much greater precision can be gained in the bibliographic control of items.

Even though my comments address the technical services aspect of the issue, the end result is a greatly enhanced catalog for the user and for the staff assisting in the use of the catalog. *John B. Martin, Coordinator of Bibliographic Control, Auburn University at Montgomery, Alabama.* ■■

INSTRUCTIONS TO AUTHORS

Information Technology and Libraries welcomes manuscripts related to all aspects of library and information technology. Some specific topics of interest are mentioned on the masthead page. Feature articles, communications, letters to the editor, and news items are all considered for inclusion in the journal. Feature articles are refereed; other items generally are not. All material is edited as necessary for clarity and length.

Manuscripts must be typewritten and the original submitted with one duplicate. Do not use onion skin. All text must be double-spaced, *including footnotes and references*. Manuscripts should conform to *The Chicago Manual of Style*, 13th ed., rev. (Chicago: Univ. of Chicago Pr., 1982). Illustrations should be prepared carefully as camera-ready copy, neatly drawn in a professional manner on separate sheets of paper. Manuscript pages, bibliographic references, tables, and figures should all be numbered consecutively.

Feature Articles consist of original research, state-of-the-art reviews, or comprehensive and in-depth analyses. An abstract of one hundred words or less should accompany the article on a separate sheet. Headings should be used to identify major sections. Authors are encouraged to relate their work to other research in the field and to the larger context of economic, organizational, or management issues surrounding the development, implementation, and use of particular technologies.

Communications consist of brief research reports, technical findings, and application notes. An abstract need not be included.

Letters to the Editor may offer corrections, clarifications, and additions to previously published material, or may be independent expressions of opinion or fact related to current matters of concern in the interest area of the journal. A letter commenting on an article in the journal is shared with the author, and a response from the author may appear with the letter.

News and Announcement items may announce publications, conferences, meetings, products, services, or other items of note.

Book Reviews are assigned by the book review editor. Readers wishing to review books for the journal are invited to contact the book review editor, indicating their special areas of interest and expertise.

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