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Information Technology and Libraries

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To Boolean or Not To Boolean?

Whether or not to provide free-text, keyword/Boolean search capabilities has been one of the key but insufficiently examined issues facing library planners and makers of online public access catalogs (OPACs) for the past couple of years. It is possible to provide keyword access without Boolean logic, word proximity, or field specification retrieval methods in OPACs, but that would be like manufacturing a high performance automobile without a steering mechanism. In the rapidly evolving and expanding world of online library catalog search systems, the question addressed in this editorial is increasingly being answered in the affirmative by librarians planning for OPACs, leading library systems consultants, and system designers. I welcome this opportunity to point out that the decision does not involve mutually exclusive alternatives, and to sound a warning against uncritical acceptance and wholesale introduction of conventional Boolean search methods in online library catalogs.

The more thoughtful, concerned OPAC enthusiasts frequently ask these questions about Boolean searching of the library catalog: Will the user *understand* the logic of combinatorial searching (AND, OR, NOT) well enough to perform it effectively? and Will the user be able to explicitly *express* his/her search request in the precise Boolean language and syntax of a particular system? These questions reflect important issues that are currently being addressed and resolved by OPAC designers who are attempting to build easy-to-use, friendly communications interfaces into the new catalog retrieval systems—systems designed for use by a variety of trained and untrained users. New conversational dialogue techniques are being used to replace the conventional Boolean commands and formal request language required in information retrieval systems like DIALOG and BRS.

There are, however, additional, more fundamental Boolean-related issues which should be addressed by OPAC planners and designers. Should the keyword/combinatorial, postcoordinated searching approach be the only approach provided in OPACs? Is it really the best approach to searching a catalog consisting of MARC records? If keyword/Boolean searching is permitted, where in the catalog search process can it be used most advantageously? How can it be integrated, through automatic search aids and online guidance, with nonkeyword, assigned (controlled) vocabulary phrase-match searching to optimize the search process?

Most online catalogs developed prior to 1980 did not provide keyword/Boolean search capabilities. The early online catalogs either supported searching by derived author or title search keys, or, emulating card catalog searching, permitted only direct-entry phrase-match searching of author, title, or subject entries. Phrase-match searching requires that the word, words, or names of the search argument match the author, title, or subject entry word by word, in the order specified, beginning with the left-most significant word of the entry. Phrase-match searching is supported in part by the "field-chunk" method of indexing cat-

alog records for online access. With the exception of words on a stoplist, the author, title, or subject phrase entered by the cataloger is extracted, intact and in order, from the bibliographic record to create the index entries to be matched in the catalog search process. Thus phrase searching is precoordinated searching, because the relationships between component words in the phrase are precoordinated by the cataloger and are kept intact during the "field-chunk" indexing process.

Keyword, component-word searching is the opposite of phrase searching. In single-word keyword searching on an assigned (cataloged) phrase, a match will result if the search word appears anywhere in the phrase. Multiple-word free-text searching—searching free of the imposed order of phrase searching—requires that the searcher define and specify the relationship between the words of the search argument. Boolean logic operators (AND, OR, NOT) are typically used to specify search word relationships in keyword-based retrieval systems. Keyword/Boolean searching is commonly referred to as postcoordinated searching because the word relationships are not built into the indexes, but must be defined by the searcher in the search request expression. The indexes which support keyword/Boolean searching are typically inverted files of single words with linking pointers (alphanumeric codes) to the records from which they were extracted.

Precoordination and postcoordination have long been recognized as two fundamentally different approaches to indexing and online searching. The trend today in OPAC development is clearly toward providing keyword/Boolean access. Where there once was the desire to emulate and replicate card catalog phrase-match searching, there is now an excited rush to emulate the keyword/Boolean orientation of the conventional online subject information retrieval systems like DIALOG and ORBIT. Of today's OPACs, about one-third utilize only phrase searching, one-third provide only keyword/Boolean searching, and one-third support and permit both types of access.

What accounts for this new enthusiasm for the Boolean, postcoordinated searching approach in OPACs? Some possible answers include (1) recent research findings which reveal that a whole lot of subject searching is going on in OPACs; (2) the belief that the major online search services (DIALOG, BRS) are mature, powerful systems and represent the search model to be followed; (3) the belief that card catalog search methods are inadequate, especially for subject searching; and (4) the availability of new, more powerful minicomputers that can now support the processing overhead incurred by the sort/merge operations required for keyword/Boolean retrieval.

This new enthusiasm had led some OPAC makers to incorporate *only* keyword, postcoordinated search methods, excluding the controlled-vocabulary phrase-searching approach altogether. Several phrase-search OPACs have added keyword/Boolean capabilities, but I know of no original keyword-based OPACs that have added phrase searching capabilities.

Boolean searching can be a powerful tool if used well, but its drawbacks are well documented. Its use in the formulation of search requests is not natural to the novice searcher. It is costly in terms of system resources and the time spent by the searcher sifting through nonrelevant retrievals. Boolean searching is not precise searching, and false term combinations are common. Keyword/Boolean searching alone on the vocabulary of title and subject fields of the MARC record may not improve recall because works assigned the same or related subject headings may be missed.

On the other hand, precoordinated phrase searching is a more efficient method of searching for both system and user when the established name, title, or subject phrase is known. Users do not have to search through multiple screens of data to find the item or items desired. Recent OPAC use findings indicate a lot of known-item searching is still going on (30 to 60 percent, depending on location), and a significant amount of it with full author's name or full title.

To provide only keyword, postcoordinated searching in OPACs is a misguided design philosophy; where installed, such OPACs can do a real disservice to catalog searchers. Keyword/Boolean searching was designed primarily to facilitate free-text searching of uncontrolled vocabulary fields in document citations, such as titles and abstracts. It was never intended as a wholesale replacement for controlled-vocabulary, precoordinated searching, but, rather, as an adjunct and complementary form of access.

Both search approaches are needed in online library catalogs. They can be integrated creatively to improve access. For example, when phrase searching fails, the system could automatically conduct a keyword "AND" search with the component words. There is precious little subject information in today's catalog records, and keyword access to titles and subject headings can increase the chances that the searcher's entry vocabulary will match the approved, assigned vocabulary of the catalog. The searcher should also be permitted to take advantage of the precoordinated information in the fields of a MARC record. Phrase searching is more efficient for known-item searching, and searching on the controlled subject vocabulary will improve recall. We should not let the "sirens of Boolean" woo us away from investigation and efforts to improve online links between entry vocabulary and the assigned, controlled vocabulary, online links between related subject terms, and online, intelligent search guidance.

CHARLES R. HILDRETH
Research Scientist,
Office of Research,
OCLC Online Computer Library Center

(The views expressed in this editorial are those of the author and do not necessarily represent those of OCLC.)

Commentary **3**

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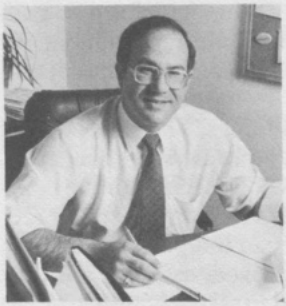

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Public Policy and National and International Networks

Frederick G. Kilgour

This first Samuel Lazerow Memorial Lecture will examine the impress of public policies on national and international computerized networks. To set the scene within which public policies are formulated, there will first be a review of the characteristics of modern European governments as contrasted with government in the United States. There will follow a discussion of public policies related to national networks in the United States and other countries. Next will be descriptions of the effects, largely deleterious, that public policies are currently imposing on activities of international networks. The conclusion will inspect the intent of those public policies and evaluate the current status of public policy and law in regard to computerized information processing.*

Public policies arise from multitudinous sources, the principal one being legislation, either national or provincial. In addition, formal executive and administrative orders create public policy. Finally, government officials informally produce public policy by their decisions, discussions, and sometimes mere offhand remarks. Legal officials, for example, in a commendable desire to place their government in the best possible position, may sometimes issue a legal interpretation most favorable to government but actually lacking a base in statute. For another example, a budget review officer may refuse to accept a budget request for funds to carry out some process that he or she feels should not be undertaken.

TYPES OF GOVERNMENT

European governments are generally characterized as "modern," whereas the government of the United States has its origins in the Middle Ages. In European governments there are three patterns of modernization, namely, rationalization of authority, differentiation of structure, and mass participation. Although the U.S. government has outdone European governments in mass participation, it has not been modernized with respect to authority and structure.

In seventeenth-century Europe, a newly evolved doctrine of sovereignty concentrated authority and produced the concept of the divine right of kings. British Puritans and Cavaliers immigrating to North Amer-

*This paper was given as the first Samuel Lazerow Memorial Lecture at Columbia University on April 6, 1983. The Lazerow Lecture was established by the Institute for Scientific Information (ISI) in honor of the late Sam Lazerow, a vice-president of ISI and a 1941 graduate of Columbia SLS. Prior to joining ISI, Lazerow had worked at the Enoch Pratt Free Library and all three national libraries: The National Library of Agriculture, National Library of Medicine, and Library of Congress. During his long career, he served on many national committees and made important contributions to the management of library and information service.

Frederick G. Kilgour is vice-chairman of the Board of Trustees of OCLC. Manuscript received May 1983; accepted June 1983.

ica largely to escape the civil strife associated with that concentration of authority brought with them the essentially medieval Tudor government and installed it in the colonial governments. The Tudor period in England, although establishing the supremacy of the state over the church, divided political power between the king and Parliament in much the same manner as between the king and the nobility in the Middle Ages. This ancient Tudor idea of divided authority has remained the basic concept of the U.S. national and state governments.

In contrast, in the modern governments of twentieth-century Europe, power has become concentrated in an individual leader or in a monolithic political party that controls the legislative body and furnishes the executive officials from its members in that body. In Tudor England, local residence was a legal requirement as well as a political fact for membership in Parliament, and this requirement for local residence was transplanted to the United States where it still persists. However, modern Great Britain has discarded the local residence requirement, so that today a member of Parliament is not oriented toward his constituency. This gap between a British M.P. and his constituents often astonishes Americans, but the ability of outstanding political figures in Britain to remain in Parliament by shifting constituencies has made a major contribution to the concentration of authority in Britain.

In the United States, power is distributed throughout a governmental structure. The president of the United States does not have the authority vested in a European prime minister, who is both a member of Parliament and head of the political party controlling Parliament. The lack of concentration of authority in the chief executive of the United States has enabled one author to write, "The Presidency is, indeed, the only survivor in the contemporary world of the constitutional monarchy once prevalent throughout medieval Europe," and to add, "Today, America still has a King, Britain only a crown."[1] In the United Kingdom, which has its rules for government but no written constitution, the prime minister can call an election whenever he or she desires. There are no checks and balances, no federalism, and no separation of powers.

In contradistinction, the written constitution of the United States is a device for limiting government, not unlike the Magna Charta, which was described by one group of authors as "the feudal document designed to preserve the prerogatives of the nobility from the encroachments of King John."[2] The Constitution divides political power among the executive, legislative, and judicial branches of the federal government and additionally reserves some authority to the individual states, where authority is in turn similarly divided. This has led to the apparent anomaly, commented on by many writers, that in the United States, where the private sector emphasizes efficient organization, the public sector yields what some have called a superior inefficiency. As we shall see, division of governmental authority also militates against the establishment of a national policy on information.

NETWORKS AND PUBLIC POLICY IN THE UNITED STATES

As is well known, there is no "national" computerized library network in the United States, and because of the separation of powers it is not easy for the national government to establish one. Although the U.S. Congress could establish a network corporation, it is most unlikely to do so. Congress also has the power to establish interstate compacts, but it seems even less likely that it would establish a national library network employing this device. It did, however, charter at least one information processing agency when, in 1937, it incorporated the American Chemical Society, which operates the celebrated Chemical Abstracts Service.

Two national government agencies have set up library networks. The librarian of Congress established the Federal Library Committee in 1965 and reorganized it in 1973. The committee operates FEDLINK, a group of federal government libraries that are participants in the Online Computer Library Center (OCLC). The National Library of Medicine has also established a network of medical libraries using

Medline, its online information retrieval service, and Catline, NLM's online computerized catalog service.

The individual states of the United States possess, in general but not exclusively, the prerogative of corporation law, and most states have a nonprofit corporation law that enables them to establish nonprofit corporations. Examples of networks that have been incorporated under such laws are the Amigos Bibliographic Council, the Michigan Library Consortium (MLC), OCLC, Ohionet, Palinet, the Research Library Group (RLG), the Southeastern Library Network (SOLINET), and Wisconsin Interlibrary Services (WILS). Corporations established under general enabling legislation of the various states enjoy considerable flexibility with regard to scope of purpose, powers, and membership, as well as to details of organization and governance. Less flexibility usually exists, however, when a legislature passes a specific act to set up a specific corporation.

State legislatures have also passed special acts of a general nature that make it possible for an agency of the state to approve establishment of a library network. Such an entity is the Indiana Cooperative Library Services Authority, established by the approval of the state attorney general under the provisions of enabling legislation entitled Library Services Authority Act, originally enacted in 1967 by the Indiana legislature. An example of a specific act establishing an individual library network is the Washington Library Network Act passed by the legislation of the state of Washington in 1976.

A state agency can establish a network as an organizational unit of the agency. Examples of this type of network are the Minnesota Interlibrary Telecommunications Exchange established by the Minnesota Higher Education Coordinating Board, and the SUNY/OCLC network established by the State University of New York. State libraries have been active in this area with the Illinois State Library establishing the Illinet Bibliographic Database Services and the State Library of New York setting up the New York State Interlibrary Loan network (NYSILL).

Charles H. Stevens[3] and Huntington Carlile[4] have published useful discussions of the governance and legal structures of library networks in the United States. The preceding paragraphs have drawn heavily from these two publications.

Evaluation

National public policy in the United States has had little effect on library networks, largely because the organization of the U.S. government is not particularly amenable to the construction of such policies. Perhaps the principal advantage emanating from this situation is that librarians have not been waiting to see what the national government would do. Rather, they have been able to move ahead depending on state governments and state agencies to create networks as legal entities.

Two states, Connecticut and Ohio, established the two existing nationwide computerized networks, RLG and OCLC. Individual states have also incorporated the several multistate networks such as Amigos, Palinet, and Solinet. By and large, the public policy at the national and state level has been neutral, but the capability of states to incorporate networks could effect a partial breakup of existing nationwide and multistate networks, thereby decreasing availability of library resources and causing higher costs by diminishing economies of scale. Such a public policy could almost come into being unintentionally if states establish statewide networks that aim to operate only within their own borders.

NETWORKS AND PUBLIC POLICY IN OTHER COUNTRIES

For the most part, in countries other than the United States, it is the central government that enables establishment of academic and public libraries and that directly or indirectly supports these institutions financially. An example is the Public Libraries and Museums Act 1964 passed by the British Parliament, which provides for less flexible organization and operation of public libraries than do the general acts in the states of the United States.

Of the twelve computerized library networks in existence, three are in the United

States. Of the other nine, five operate as units within a national library, two were established under the general laws of a country, and two are programs of universities.

Networks that are programs of a national library are the Australian Bibliographic Network (ABN), Koninklijke Bibliotheek en Universiteitsbibliotheken (PICA) in the Netherlands, and the Swedish Library Information System (LIBRIS). In the United Kingdom the British Library operates the British Library Automated Information Service (BLAISE) and the proposed U.K. Library Database System (UKLDS). The National Library of Scotland has the Scottish Libraries Cooperative Automation Project (SCOLCAP).

The two networks incorporated under the laws of a country are both in the United Kingdom: BLCMP (Library Services) Limited and Southwest Academic Libraries Cooperative Automation Project (SWALCAP). Two networks are programs of universities, one being the University of Toronto Library Automation System (UTLAS) in Canada and the other the Hong Kong Library Network based at the University of Hong Kong. Another network that operates on individual computers is based at the University of Lausanne (Switzerland); it looks forward to online operation, but at present there is no interconnection.

Network planning in Germany calls for seven regional networks that correspond to units of the Deutsche Forschungsgemeinschaft (DFG). Development activity has been under way for some time in the regions, but as yet none of the regions is operating on a full-fledged online network. Four will probably go online in the foreseeable future, and DFG hopes to interlink the seven regions to form a national network.

Danish research libraries have recently initiated a network using both dedicated lines and dial-up access and will be implementing a new design in 1984. In mid-1983, Danish public libraries will also implement an online network.

Evaluation

Long periods of development seem to characterize library computer networks that are units of a national government agency. For example, such networks as UTLAS in Canada, the Hong Kong network, BLCMP and SWALCAP in the United Kingdom, as well as the three networks in the United States, were all brought to full operational level much more rapidly than ABN, PICA, LIBRIS, BLAISE, UKLDS, and SCOLCAP. The regional computerization in Germany and the research library computerization in Denmark are also requiring long periods of time to develop into full operation. There can be no doubt that bureaucracies contribute not only to slow development but also to inflexibility in activity.

There are other disadvantages to establishment of networks by national governmental agencies. Some countries are requiring that cataloging data be produced locally; others feel that their catalogs must also be produced locally to be under their control, even though each library has its own catalog in its own institution. Many countries, such as Denmark, the Netherlands, and Sweden, probably have too few libraries to be able to enjoy any significant economies of scale. Also, some European countries are regulating their telecommunication prices so as to make dedicated private lines extremely expensive, and at the present time it is such lines that make an online library network economically viable. Other countries are changing their method of pricing telecommunication activity from time involved to volume of messages involved, which again threatens economic viability. Many of these negative effects of public policies are seen as diminished, however, by the strong financial support these networks receive from the central government.

INTERNATIONAL NETWORKS

National "made-and-done-here" policies designed to support local activities have a decidedly negative effect on international network operation. Such half-blind perceptions as that the catalog of a library resides outside the country when the library participates in an international network, and requiring at least some computer pro-

cessing of data to be done within a country, do not stimulate international networking. Such perceptions and requirements also have a negative impact on local activity, where they deprive the citizenry of a country of real benefits in the form of computerized processes and information resources.

Telephone systems are government monopolies in most countries, being operated by the Post Telephone and Telegraph (PTT) agencies of the national governments. The West German PTT has decreed that there must be some computer processing within West Germany of data to go out of West Germany on telephone circuits. Also, the German PTT will have raised its rates for private lines by 600 percent during the next five years.

The policies of national libraries can be supportive or obstructive to international library networking. The Library of Congress has been outstandingly supportive and cooperative for both national and international networking and has made its MARC II records more freely available than most, if not all, other national libraries. The Deutsche Bibliothek in West Germany and the Royal Libraries in the Netherlands and Sweden possess cooperative attitudes.

Unstable exchange rates and national devaluations are serious hindrances to international networking, since both the participating libraries and the network center—if they are located in different countries—run a risk of losing money over the course of a financial year. Although most of this risk can be diminished, and firm prices established, by the purchase of forward hedges, a forward hedge sometimes costs more than the legal limit of the change in exchange rate; this situation, which has recently arisen within the European Economic Community, will cause money to be lost no matter what path is followed. Large devaluations can be severely detrimental to an international library network, for its outstanding invoices may lose as much as one-fifth or one-fourth of their value overnight.

The major public policy obstacle to international networking is restriction of transborder data flow (TDF). Although Sweden initiated such restriction with a protection of privacy act over a decade ago, it has been the French who have brought TDF to its present state of obstruction. In 1978 Simon Nora and Alain Minc, two French civil servants, in their *Computerization of Society; A Report to the President of France*, stated that there was a revolution in the making that would result in small personal computers replacing the giant computers known theretofore. The authors were of the opinion that this would lead, in turn, to indiscriminate passage of data over national boundaries and that TDF must therefore be controlled and regulated. The Nora Report immediately generated high-level support in France for the national development of information processing and regulation. Recently the French have proposed amending the General Agreement on Tariffs and Trade that would make it possible to tax computer data; in other words, tax would no longer be levied on the retail value of a magnetic tape, but on the intrinsic value of its contents, which might be several million dollars. Taxing intrinsic value of data flowing over telephone circuits would be extremely difficult to maintain.

The French government now has a Commission on Transborder Data Flows of which the chairman is Alain J. Madec. In October 1980 Madec told a meeting of the Organization for Economic Cooperation and Development that:

> International exchanges of information concern an asset of universal value which can generate wealth or power for those who hold it. Oddly enough though, these flows are largely untouched by the traditional rules governing trade in products: they seldom appear in the accounts of those concerned and, where made between related bodies, are rarely invoiced at their "transfer price." Neither are they recorded by the customs, and their very volume often remains unknown to the authorities.
>
> Consequently, the free circulation of data implies far more than the concept of free trade, providing opportunities, without any possibility of control, for fraud, espionage, dumping and profit flight. Owing to lack of adequate means of measurement, moreover, the impact of information flows remains distinctly underestimated.[5]

Wholly new problems are arising as a result of interruptions to the transborder data flow on which international library networking depends.

Various international organizations have initiated studies and investigations of TDF in an effort to maintain a relatively free flow of data across international boundaries. However, some countries, particularly those in the Third World, see TDF as a further threat to their political, economic, and cultural security and have taken a variety of obstructive steps that they hope will enhance their security.

Brazil has put up so many obstacles to TDF that the phrase "The Brazilian Model" has come into common parlance. Brazil has established in the Office of the Presidency a Secretaria Especial de Informatica (SEI) charged with enhancing the well-being of Brazil by regulation of data flow. Severe restrictions are being placed on hardware when it is allowed to enter; as to the import of computer software, only programs in source code can enter Brazil. Hence it is possible for Brazilians to manipulate programs for their purposes, making it unnecessary for them to continuously import software.

Data flow outward from Brazil is severely restricted, primarily to encourage the local processing of data. Regulations also curtail the export of research data to encourage publication in Brazil. Import of terminals with acoustic couplers is limited because an acoustic coupler terminal could be used for transmission of any kind of computerized data. Dedicated lines, although more freely available, must be licensed so that transmission on such lines can be known. By and large, Brazil much prefers to import databases to be searched locally, a policy that imposes batch searching and long delays in receipt of desired information.[6]

There has been a recent relaxation allowing Brazilians increased accesses to databases outside of Brazil. In December 1982 Empresa Brasileira de Telecomunicaques S.A. (Embratel) established a new international data telecommunication system named Interdata. Subsequent to December 1982, Embratel was able to obtain from SEI permission for Brazilian institutions to access various databases outside of Brazil via Interdata; however, the database companies must send invoices to Embratel for payment, an arrangement that allows Embratel to monitor traffic on Interdata to be sure that traffic conforms with the license granted by SEI. Embratel will reimburse the database company in the currency of the invoice; in other words, an American company could invoice in dollars and receive payment in dollars, thereby having protection against an unstable exchange rate and precipitous devaluations. It therefore appears that Brazil is relaxing some of its TDF restrictions to be able to have access to information that it desperately needs. This change in Brazilian policy gives some hope that over time mutually beneficial regulation of TDF may come into being.

INTENT AND EFFECT OF PUBLIC POLICIES

The intent of public policies is clearly to support national activities, but because of the complexities involved such policies may be as often obstructive as supportive of national activities. As already seen, the United States has few examples of public policies affecting national or international networks. In the United States the Library of Congress and the National Library of Medicine are the principal supporters of libraries and therefore of networks. The United States has no defensive or protective supports for U.S. networks, and no obstacles of any significance. Another example of positive support for national networks is the West German formation of seven computerized library network regions. Similarly, Australia, the Netherlands, and Sweden support online national networks and maintain a cooperative attitude toward external countries.

On the other hand, defensive or protective policies often have a negative effect on the goals that a country wishes to achieve by denying entry of external organizations into a nation's markets. Unhappily, the "must-be-made-here" syndrome is widely increasing, as is the manipulation of taxes and tariffs. So also is the subtle regulation of data flow by exorbitantly increased tele-

communication prices that have nothing to do with the technical aspects of telecommunication.

Status of Public Policy and Law

In general it can be said that public policy and law have not caught up with the potentials of machine-readable information flow. Indeed, the activities of online computerized library networks in the United States, and undoubtedly in other countries also, are in the process of making new law by furnishing network participants not only with powerful computer processing but also with the information to be used in that processing. Countries with modern governments characterized by centralized authority are likely to be more effective in shaping new public policies and law related to transmission of computerized data, but if they are not, the struggle between the future and the past will intensify for a long time to come.

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EDITOR'S NOTES

IBM Information Centers

Karen Takle Quinn of IBM is quoted at length in "IBM Library Expert Expands Info Center Concept" in *Information Systems News*, May 16, 1983, page 32. Among the more interesting lines:

"The users don't just need digitized corporate data, they need books, technical reports, and manuals as well—and not just those created in-house," Quinn said.

Quinn did not think users should have to decide whether to go to the library or the information center to get the answers they need; they should be able to get nearly all their answers in one place.

"A librarian can analyze what the user really needs, then put into the user's hands the right tool, either a software tool to use against a data base or a piece of paper or a person's phone number."

Peter Graham, who sent the Quinn piece on to us, observed: "In brief—she is adding books to the electronic library; an ironic inversion of our expectations."

Refereeing

Walt Fraser of UC-Davis observed at ALA that "the journal was not set up to facilitate communication, but to inhibit it," alluding, of course, to its refereeing function. He also passed on the worst reviewer's comment he'd ever heard: "There is no merit in the paper—it is not even wrong."

MARC Coding of DDC for Subject Retrieval

Arnold S. Wajenberg

An expansion of the MARC codes for decimal class numbers is recommended, in order to enhance automated subject retrieval. Five values for a second indicator and two new subfields are suggested for encoding hierarchical relationships among decimal class numbers. Six additional subfields are suggested, in order to analyze synthesized class numbers.

As libraries move toward online catalogs in increasing numbers, there is a growing interest in improving subject access to the stored bibliographic data. Keyword and subfield searching of subject headings, keyword searching of titles, and searching abstracts and tables of contents are all being investigated as ways of using the capabilities of computers to enhance subject access. There is also increasing interest in the use of classification for subject retrieval.[1] The British system, BLAISE, already permits machine searches on class numbers, and LCS, the automated system developed at Ohio State University and now used by a number of other libraries, allows the user to browse through a machine-readable shelflist by means of the SPS (shelf position search) command.

The great advantage of a classification system for subject retrieval is that it brings related topics together without regard to language or the accidents of terminology. For example, in the Dewey Decimal Classification (DDC), works on alcohols, ethers, aldehydes and ketones, acids, and esters, all oxy and hydroxy compounds, are assembled by means of the following sequential numbers: 547.031, 547.035, 547.036, 547.037, 547.038. (All examples of classification are taken from *Dewey Decimal Classification and Relative Index*, devised by Melvil Dewey, 19th ed., edited under the direction of Benjamin A. Custer, Albany, N.Y.:Forest Press, 1979.) The benefits of assembling related topics are intensified by the practice of organizing subjects hierarchically, a characteristic of DDC and to a lesser extent of the Library of Congress classification, the other major system used in the United States. Thus, in the example given above, general works on oxy and hydroxy compounds are classed in 547.03, organic chemistry in general is classed in 547, and chemistry as a whole in 540.

SPECIAL CHARACTERISTICS OF DDC

There are two special characteristics of DDC that make it particularly well adapted to automated retrieval: the clarity with which hierarchy is usually expressed in the notation, and the capability of synthesizing numbers.

For the most part, hierarchy is expressed in DDC by the length of the numbers. Thus, general concepts tend to be represented by relatively short numbers, and specific aspects or topics of the general concepts are represented by adding digits to the

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shorter numbers. That can be seen in the example given above, but another example from elsewhere in the schedule might be helpful:

320 Political science
323 Relation of state to its residents
323.4 Civil rights
323.44 Freedom of action (Liberty)
323.448 Right to privacy
323.4483 Freedom from misuse of information in data banks

With this notational structure, a search can be made more specific by adding digits, or more general by dropping them off. (Every DDC number must have at least three digits, so the discipline "political science" is represented as 320, although conceptually it should be 32.)

Another advantage of DDC is its ability to add numbers from one part of the schedule to other numbers, or to add numbers from special tables to a wide variety of class numbers. That is, DDC is, to a limited extent, a faceted classification. This allows DDC to express the relationship of one topic to another.

Perhaps the best known example of faceting in DDC is the indication of historical or geographical treatment of a subject by adding to the number for the subject the standard subdivision number 09 (from DDC Table 1), and then the appropriate area number from Table 2. Thus, the history of civil rights of the United States is classed 323.40973; the history of civil rights in Great Britain is classed 323.40941. This example illustrates the use of zero as a facet indicator for standard subdivision numbers, and in fact every standard subdivision number is preceded by at least one zero. Unfortunately, however, that is not the only use of zero in DDC, so it cannot be used as a signal to a computer that what follows is a number from DDC Table 1.

MARC CODING OF DDC NUMBERS

At present, the MARC format provides two tags for DDC numbers, 082 for numbers assigned by the Library of Congress, and 092 for numbers assigned by other libraries. The same indicators and subfields are used with each tag. The first indicator shows whether or not the edition of DDC that was used is shown later in the record. A blank for first indicator means that the edition is not identified. A zero means that the edition is identified, and that the complete edition was used. First indicator "one" means that the edition is identified, and that the abridged edition was used. No values have been assigned to the second indicator. Subfield a contains the class number; subfield b, the book number, and subfield 2 the number of the edition of DDC from which the class number was taken. An example of an encoded DDC call number would be:

0920b≠a355.4744≠bW32c≠219

This coding pattern is perfectly adequate to guide a computer in printing call numbers on catalog cards, and makes it possible to search a database by class number. However, neither hierarchy nor synthesis is represented in any way in the coding. This restricts somewhat the ability of a computer program to manipulate or search the class numbers.

As was mentioned above, the DDC notational system usually makes the hierarchy obvious by assigning a longer number to a specific topic, and a shorter number to the more general concept. Sometimes, however, this practice is not followed, because it tends to produce excessively long class numbers. For example, under 621.8 (machine engineering), the following sequence is found:

621.86 Materials-handling equipment
621.862 Hoisting equipment
621.863 Chain hoists, mechanical and hydraulic tackles, fork lifts
621.864 Windlasses, winches, capstans
621.865 Power shovels
621.867 Conveying equipment

Here the more general subject, "materials-handling equipment," is assigned a five-digit number, and specific kinds of materials-handling equipment, i.e. hoisting equipment and conveying equipment, are assigned six-digit numbers, namely, 621.862 and 621.867. However, the specific kinds of hoisting equipment are not assigned seven-digit numbers, but instead receive sequential six-digit numbers following 621.862.

Synthesized class numbers are an even

greater problem, since they are never identified in a way that can be consistently recognized by a computer program. For example, the encoded call number shown above (355.4744) contains a synthesized class number. The number supplied from the classification schedule was 355.47, for tactical and strategic geography, to which was added 44, the number for France from Table 2, areas.

The purpose of this article is to suggest an expansion of the MARC codes for DDC numbers that will consistently encode the hierarchy of the numbers, and consistently identify and analyze synthesized numbers.

ENCODING HIERARCHY

The presently unused second indicator values of 082 and 092 provide a convenient way of encoding the hierarchical relationships among class numbers. The following values should cover the cases that can arise with DDC:

0 The closest superordinate element in the hierarchy is classed in a shorter number (or there is no superordinate element); the next subordinate element in the hierarchy is classed in a longer number (or there is no subordinate element)

1 The closest superordinate element in the hierarchy is classed in a shorter number (or there is no superordinate element); the next subordinate element in the hierarchy is classed in a sequential number of the same length. The number of subordinate class numbers of the same length is recorded in subfield c.

2 The closest superordinate element in the hierarchy is classed in the immediately preceding number of the same length; the next subordinate element in the hierarchy is classed in a longer number (or there is no subordinate element). The number of class numbers hierarchically coordinate with this one is recorded in subfield c.

3 The closest superordinate element in the hierarchy is the number of the same length recorded in subfield d; the next subordinate element in the hierarchy is classed in a longer number (or there is no subordinate element.) The number of class numbers following this one that are hierarchically coordinate with it is recorded in subfield c.

4 The closest superordinate element in the hierarchy is classed in a shorter number (or there is no superordinate element); the next subordinate element in the hierarchy is classed in a longer number (or there is no subordinate element). The closest preceding number of the same length that is hierarchically coordinate with this one is recorded in subfield d.

The indicator values and subfields described above should be able to encode all of the hierarchical relationships found in DDC. Their use can be illustrated with the numbers for material-handling equipment, which would be encoded as follows (excluding subfield b for book number):

082 00 ≠a621.86≠219
082 01 ≠a621.862≠c3≠219
082 02 ≠a621.863≠c2≠219
082 03 ≠a621.864≠c1≠d621.862≠219
082 03 ≠a621.865≠c0≠d621.862≠219
082 04 ≠a621.867≠d621.862≠219

The possible use of thus encoding the hierarchical relationships in DDC can be suggested by the following hypothetical scenario. A user of an online bibliographic database requests material on winches and capstans. The system finds nothing listed under the appropriate headings in its subject catalog, and checks the corresponding section of its classed catalog (621.864), where nothing is found. It responds with a message, "Zero bibliographic items found," or something equally discouraging. It adds, however, the following prompt messages, "If you wish to see material on related topics (chain hoists, mechanical and hydraulic tackles, fork lifts, power shovels) enter R. If you wish to see material on the broader topic (hoisting equipment) enter G." Such prompts can be supplied by programs using data encoded in indicator 2 and in subfields c and d, as described above. Of course, the prompt messages could be supplied even if data were found in the number for winches and capstans.

SYNTHESIZED CLASS NUMBERS

DDC class numbers are synthesized in three ways. First, numbers from one or more of seven tables can be added to class numbers or, sometimes, to other numbers in the tables. (The tables are (1) Standard Subdivisions, (2) Areas, (3) Subdivisions of Individual Literatures, (4) Subdivisions of

Individual Languages, (5) Racial, Ethnic, National Groups, (6) Languages, (7) Persons.) Second, numbers from one class number can be added to another class number. Third, special instructions are scattered throughout the classification which contain blocks of numbers that can be added to designated class numbers. With a single exception, synthesis takes place only when there are instructions to add other numbers to a specific class number. The exception is for the standard subdivision numbers in DDC Table 1, which can be added to any class number unless there are instructions to the contrary. Examples of each of these kinds of synthesis follow.

The use of the tables may be illustrated with two examples. A directory of entomologists in Columbus, Ohio, would be classed 595.7002577157. The number is analyzed as follows. 595.7 is the class number for insects. The schedule contains the instruction that standard subdivisions are classed .7001-.7008. (Standard subdivisions are always preceded by a zero. In this case, they are preceded by two zeros, because one zero precedes the numbers for general principles added to the class number for insects.) In DDC Table 1, -025 is listed as the number for directories of persons and organizations, with the instruction, "Add 'Areas' notation 1-9 from Table 2 to base number -025." DDC Table 2 lists -771 as the number for Ohio, and -77157 as the number for Columbus.

A second example of the use of tables would be provided by a book on symbolism in French poetry. Such a work would be classed 841.00915. French literature is classed from 840 to 848, and the schedule contains the information that the base number for French literature is 84. DDC Table 3, Subdivisions of Individual Literatures, lists -1 for poetry and -1009 for "History, description, critical appraisal of poetry from more than one period." It also contains the instruction, "Add to -1009 notations 1-9 from Table 3-A." DDC Table 3-A lists 15 for symbolism, allegory, fantasy.

Synthesis by adding one class number to another is also illustrated with two examples. The first shows that, in some cases, any number in the classification can be added to certain numbers. Perhaps the best known case is the number for subject bibliography, 016, for which the instruction is provided, "Add 100-900 to base number 016." Thus, a bibliography of works on the psychology of divorced men would be classed 016.1556432, because the class number for the psychology of divorced men is 155.6432. A somewhat more complex situation is found in the biological sciences. For example, a work on deoxyribonucleic acid in insects would be classed 595.70873282. The attentive reader may recognize 595.7 as the class number for insects. The schedule contains the following instruction, at 595.701-.708: "Add to base number 595.70 the numbers following 591 in 591.1-591.8." (591 is the number for zoology.) At 591.8 is the instruction, "Add to base number 591.8 the numbers following 574.8 in 574.82-574.88." (574 is the number for biology.) Under 574.8 (for tissue, cellular, molecular biology) is found 574.873282 for deoxyribonucleic acid.

The last means of synthesizing DDC class numbers is through the use of numbers given in special instructions throughout the classification. For example, a commentary on the Babylonian Talmud would be classed 296.12507. The number for the Babylonian Talmud is 296.125, where a footnote supplies the instruction, "Add as instructed under 296.123-296.127." At the top of the page (p.184) is the caption "296.123-296.127 Specific works." Beneath the caption is the instruction "Add to each subdivision identified by * as follows." What follows is a list of numbers, culminating with "07 Commentaries."

The different methods of synthesizing numbers are sometimes combined, as is shown by the final example. A book on the diagnosis of diseases of kidneys would be classed 616.61075. The number for diseases of kidneys and ureters is 616.61, where the classifier finds the instruction to add as instructed under 616.1-616.9. Under that caption is a lengthy block of numbers, including "07 Pathology. Add to 07 the numbers following 616.07 in 616.071-616.079." 616 is the number for diseases, and 616.075

the number for diagnoses and prognoses. Here the listing under a number given in the special instructions refers the classifier to another class number in the schedule.

ENCODING SYNTHESIZED NUMBERS

The complex relationships represented by synthesized numbers are not discernible from the numbers themselves. However, much more sophisticated retrieval would be possible if the synthesized numbers were analyzed in automated databases. The use of additional subfields in fields 082 and 092 would make it possible to express the structure of these numbers, so that the subfields could function as machine-readable facet indicators. The following pattern of subfields is recommended (including subfields in the present MARC format and those recommended above for encoding hierarchy):

a The complete class number, as it would appear on books and in catalog records.
b Book number.
c When the second indicator is 1, this subfield records the number of class numbers hierarchically subordinate to the number in subfield a, which have the same number of digits as that number. When the second indicator is 2, this subfield records the number of class numbers hierarchically coordinate with the number in subfield a. When the second indicator is 3, this subfield records the number of class numbers following the number in subfield a that are hierarchically coordinate with it.
d When the second indicator is 3, this subfield records the number that is the closest superordinate number to the class number in subfield a. When the second indicator is 4, this subfield records the number with the same number of digits as the class number in subfield a, which most closely precedes that number and is hierarchically coordinate with it.
e That portion of the class number in subfield a that is taken from the schedule before any numbers are added to it from the DDC tables or from elsewhere in the schedule.
f The number of the DDC table from which a number is added to the number in subfield e.
g The number taken from the DDC table identified in subfield f.
h A class number all or part of which was added to the number in subfield e in order to form the number in subfield a.
i The number or span of numbers beneath which (as part of special instructions) is given the number that is added to the number in subfield e in order to form the class number in subfield a.
j The number listed at the location identified in subfield i, which is added to the number in subfield e to form the class number in subfield a.
2 The number of the edition of DDC from which the class number in subfield a was taken.

The system described above explicitly identifies each element of a synthesized class number, so that it can be used for subject retrieval. The application of the system is demonstrated by applying it to each of the class numbers used to illustrate synthesized class numbers (see figure 1).

The potential usefulness of this kind of analysis can be seen from the following ex-

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082 00 ≠a595.7002577157 ≠e595.7≠f1≠g0025≠f277157≠219 (The number in subfield g begins with two zeros, although Table 1 shows just one zero at the beginning of each number, because the listing in the schedule at 595.7 shows standard subdivisions introduced by two zeros for that class.)

082 00 ≠a841.00915≠e84≠f3≠g1009≠f3-A≠g15≠219 (The number in subfield e is 84, even though 841 is listed in the schedule, because 84 is identified in the schedule as the base number for French literature, to which the numbers from Table 3 are added.)

082 00 ≠a016.1556432≠e016≠h155.6432≠219

082.00 ≠a595.70873282≠e595.70≠h591.8≠h574.873282≠219 (The number in subfield e ends with zero because, under 595.7, at .701-.708, the instruction is given "Add to base number 595.70 the numbers following 591 in 591.1-591.8.")

082 00 ≠a296.12507≠e296.125≠i296.123-296.127≠j07≠219

082 00 ≠a616.61075≠e616.61≠i616.1-616.9≠j07≠h616.075≠219

Fig. 1. Examples.

amples. If a student of comparative literature wished a comprehensive listing of works about symbolism in poetry, the system could search not only the class number 809.1915 (the number for general and comparative studies of symbolism in poetry), but also every occurrence of 1009 from Table 3, followed by 15 from DDC Table 3-A. That would retrieve works on symbolism in French poetry, American poetry, etc., wherever those tables had been applied. Similarly, for a user who wished a comprehensive listing of works on diagnosis, the system could search 616.075, the number for diagnosis and prognosis, not only when it was used for general works on the subject, but also whenever it was recorded in a subfield h as the source of a number added to the class numbers for specific diseases. Much of the structure described above would no doubt remain transparent to most library users, but it could be manipulated by library staff or by carefully written programs to refine and enhance subject retrieval in automated systems.

A disadvantage to adopting this system would be the increased time it would require of classifiers to analyze and encode class numbers. However, the profession has not hesitated to introduce elaborate coding patterns elsewhere in the MARC format, e.g., to record physical details about microforms and audiovisual material to the 007 field. It would seem at least as valuable to encode classification details in such a way as to provide better subject access to the library's collection.

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Selection of Word Processing Software for Library Use

David Block and Aydan Kalyoncu

Microcomputer word processing has emerged as an important technology in the contemporary library. In examining this emergence, the authors pursue three ends: a description of a general set of applications for word processing in a library environment, an evaluation of four popular word processing programs based on their performance of a set of library-oriented tasks, and a discussion of the range of "non-performance" factors which influence the selection of a particular word processing package from the large number currently available for purchase.

This paper combines two approaches to present a discussion of microcomputer-based word processing software. The first analyzes the uses of word processing in a library environment, describing both present reality and future prospect. The second approach offers evaluations of commercial software packages and how they perform a variety of operations. Rather than simply offering a feature-by-feature comparison of the programs, this essay establishes evaluative criteria in terms of how well each system performs a set of library-oriented tasks. Thus, in addition to providing a comparison of Apple Writer II, Screen Writer II, Magic Wand, and Wordstar, we hope to suggest a methodology that will prove useful for evaluating other word processing systems for library use.

THE TRAJECTORY OF WORD PROCESSING

Word processing in its current form combines the advantages of computer technology with the familiar environment of electric typing. It allows the creation of text in an electronic medium, editing of this text interactively, storage of text in a durable medium with random access characteristics, and rapid, automated output with formats defined by the user.

The most-often-cited advantage of word processing is its reduction of keystroking; a document must be keyed only once in full form. Subsequent changes are integrated with the original and stored for immediate transmission to a printer. The formatting characteristics of word processing provide additional benefits. Line length, spacing, and justification, as well as special characteristics such as headers and footers, can be set and then changed for an entire document with a few simple operations.

With its reduced keystroking and formatting characteristics, word processing offers dramatic advantages over conventional typing. One author has estimated that "well managed word processing can improve productivity over 500 percent and save many thousands of dollars in organizational overhead per keyboard each year."[1]

The technology just described did not spring upon the world full-blown. The ge-

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nealogy of word processing spans three machine-generations, some twenty years. Magnetic media systems such as the magnetic type composer used in offset printing, and electronic memory systems widely employed in "smart" typewriters, provided earlier alternatives to retyping originals to accommodate changes in text or format. The third generation incorporates display-based systems—for simplified text entry and editing—employing microcomputer technology.

It is this third generation of word processing which produced the greatest potential for library use. With the dramatic drop in hardware costs and the production of sophisticated 8-bit software, both dating from the late 1970s, word processing entered the world of microcomputers and microbudgets.

LIBRARY USES OF WORD PROCESSING

Despite the pioneering suggestions of Allan Pratt, library literature has been slow to recognize the implications of word processing for the profession.[2] In fact, *Library Journal*'s extensive forecasting of trends in microcomputing, published in July 1980, ignores word processing altogether.[3] However, recent articles such as those published by Michael Schuyler and Ted Hines, and the featured sections of trade journals (e.g. *Byte*, *Creative Computing*, and *Nibble*) have established many of the themes developed in this essay.[4]

To facilitate analysis, we have grouped discrete library applications for word processing software into the following general categories: (1) production of documents in need of frequent updating or revision; (2) preparing scholarly essays; (3) production of proposals and library reports including the annual report; (4) storage of forms and other periodically used texts; (5) file building and management.

Libraries produce a large number of documents that demand revision or updating; bibliographies, accession lists, reserve lists, descriptions of library services, and policy/procedure manuals are obvious examples. Revision utilizes the entry and edit functions of word processing, making facility in these two basic areas an important criterion in evaluation. A system should allow uncomplicated entry of text and subsequent additions, deletions, and movement of parts of the document without rekeying.

Scholarly essays require an apparatus for inputting a variety of special characters such as foreign language diacritics and scientific symbols. Also important is some provision for footnote generation, including superscripts and the capacity to print footnotes at the bottom of the appropriate page no matter how many revisions the document undergoes. Document length also becomes a consideration in scholarly writing. With some word processing programs, the length of the document is limited to the size of the computer's memory; other programs access the entire disk storage capacity.

Major reports combine the need for revision with the requirement of presenting statistics in a form that complements the report narrative. To perform this second function, the software must allow for easy creation of column-oriented tables. Also desirable is compatibility with a statistical package for merging formatted numerical data with text files.

Creation of text for storage and multiple retrieval presents a wide range of possibilities in the library environment. Instructions and replies to vendors, letters to library donors, and overdue notices could be keyed, stored, and printed on demand. This "boilerplating" capability offers the possibility of customizing documents to suit a variety of situations as phrases and paragraphs are combined to build new text. One example of this type of activity is the merging of address and letter files to produce "personalized" correspondence from large mailing lists. The ways in which word processing software labels its files, its ability to rapidly access stored text, and the size of the storage capacity of the system determine its facility in these operations.

File building and management have been indirectly introduced in the discussion of other functions. Word processing has the potential for creation of files, such as bibliographic entries or addresses, and for sorting them alphabetically, numerically, or by subject content. To fulfill this potential, the system must be able to parse its files and locate letters, numbers, and strings, create

separate files containing the resorted entries, and print these new arrays. This function suggests the merging of word processing and database management.

HARDWARE CONSIDERATIONS

Although this essay is principally concerned with evaluating software packages for library use, certain basic hardware considerations underlie the discussion ahead. First, and perhaps most vexingly, the emergence of new technology raises fundamental problems for those faced with the purchase of a word processing system. The 16-bit microprocessor is very attractive for it holds out the potential for increasing addressable memory size and computation speed and for amplifying the useable character set beyond standard ASCII. However, as of early 1983, 16-bit potential is largely untried and virtually unsupported by prewritten software. A second emerging technology with implications for any decision maker is the configuration now visible under the Apple logo as *Lisa*. With this system, keying in information and commands gives way to a remote sensor called a "mouse," which reads in data and has the capability of transparently merging a variety of software packages for performing multiple operations on a set of data and formatting it into a report.

Conventional 8-bit microprocessors, those which run the packages reviewed in this essay, also pose problems of evaluation. As we discuss below, these programs are written for specific hardware and operating systems. While a microcomputer can be altered with the addition of circuitry, such alterations come with large price tags. A standard Apple II Plus unit needs CP/M and Z-80 cards that cost some $600 to enable it to run WordStar or Magic Wand. This is in addition to the cost of the software itself.

Potential buyers should also be aware that many of the sophisticated features written into word processing programs necessitate corresponding hardware sophistication. For example, an 80-column display is an option on many microcomputers. And the ability to produce authentic fully justified text requires a printer capable of varying the space between characters of the same word as little as $^1/_{120}$ inch at a time. This "microjustification" is currently available only on expensive instruments such as the Qume Sprint 5 and Diablo 630. Many other printers will full-justify but do so by varying spaces between words, which produces windows in the text.

SOFTWARE EVALUATIONS

We chose the Apple Writer II, Screen Writer II, Magic Wand, and WordStar packages for a variety of reasons. First, they are widely available. WordStar was a pioneer in microcomputer word processing and remains the leader in units sold.[5] Apple Writer sales increased dramatically with its inclusion in the discounted hardware package sold by Apple last fall. And, though sales figures are not available, Magic Wand and Screen Writer claim to approach WordStar's sales over the past six months. Second, these four packages present a range of price and features. Apple Writer is inexpensive and contains a basic set of functions. Magic Wand and WordStar are in the $300 range with robust possibilities. Screen Writer falls into a middle range in price and features. Finally, we wanted to have examples of programs that would run on the two major competing microcomputer hardware and operating systems. WordStar and Magic Wand are Z80 and CP/M-based, Apple Writer and Screen Writer operate on 6502 and Apple DOS.

Apple Writer II

- Apple Writer II. Apple Computers Inc. 10260 Bandley Drive. Cupertino, CA 95014. Hardware configurations: Apple II or II plus, 48K memory, disk drive. Cost: ca.$100.00.

Basic entry and editing are accomplished from a single mode using the "ESCAPE" key. Since lowercase is not written into Apple Writer, the user must embed capitals into text using "ESCAPE" or add a hardware enhancement to enable the "SHIFT" for capitalization. Additions to text may be inserted anywhere in the file by moving the cursor to the desired location, with the remaining text reformatted interactively.

Editing is aided by a "Find" function that allows for correction of a redundant mistake or using a shorthand which is later upgraded to full form throughout the text. Apple Writer features "Move" functions

that transfer segments of text from one location to another. However, this feature is limited by the program's inability to hold strings longer than 1,024 characters.

Apple Writer has made some allowances for scholarly production. Provisions for footnotes include superscripts entered manually or from a stored program called "Special," the ability to create citations in a buffer for placement at the end of each page, and the inclusion of a few foreign language diacritics in the "Special" program. The software does not provide a range of scientific symbols, but—as with all four packages reviewed—this deficiency is due as much to the limitations of an 8-bit address space as to limitations of the software itself.

Report writing exposes some of Apple Writer's limitations. As presently written, the package is compatible with a spelling checker only. It cannot be combined with a statistical display program. In fact, as far as we have been able to determine, Apple Writer cannot interpret statistical display files for reformatting. The user is reduced to setting out tables and diagrams on a statistical package, making space for them in the Apple Writer text, and cutting and pasting them together. All of this is a significant drawback when one considers that the most widely distributed statistical displays, the VisiCalc series, were designed for use on the Apple II system.

File building is easily accomplished on Apple Writer using the entry and edit functions described above. The size of files is determined by the amount of volatile memory of the hardware. A 48K memory holds approximately 20,000 characters or thirteen double-spaced pages; 64K increases input potential to 30,000 characters, or some twenty pages. Longer documents must be stored as discrete files. Since Apple Writer cannot "chain" these files together to create longer documents, each file must be manipulated independently. This forces the user to forfeit the advantages of global strategies such as moves and searches if the text is greater than the addressable memory. Apple Writer can load and print file segments using separately composed applications programs written in so-called WPL (Word Processing Language). This user-embedded shorthand adds instructions for loading, printing, clearing memory, and then beginning the cycle anew by loading another file. WPL works well for defined activities; in fact, a mail merge program that combines address and text files has been written into the system disk. However, custom applications take extensive tinkering.

Only primitive file management is possible on Apple Writer. Files can be searched using the "Find" function. But "Find" is written for the linked "Replace" operation rather than for retrieval, and a "WPL" program would have to be written for printing of text segments such as the bibliographic entries corresponding to a searchable set of subject terms. Without the same sort of extensive programming, no sorting is possible on Apple Writer files.

WordStar

•WORDSTAR Version 3.X. MicroPro International Corporation. 1299 Fourth Street, Suite 400. San Rafael, CA 94901. Hardware Configurations: Z80-based microcomputers, 48K RAM, Disk Drive with CP/M operating system. Cost: ca. $300.00.

WordStar was a pioneer in the menu-driven format of application software for micros. Like its predecessors, release 3.X operates through a series of screens, each replete with its own subfunctions and prompts. The large number of commands, their sometime non-mnemonic nature (e.g. "CONTROL B" is used to reformat), and the necessity of moving back and forth between menu screens make WordStar more difficult to master than its competitors. However, this inconvenience is balanced by the imaginative editing features that the system supports.

WordStar contains a wide range of editing capabilities: deletions, insertions, justification, centering, tabbing, and movement of blocks of text throughout the file. The WordStar display closely simulates resulting hard copy with special punctuation, symbols, and a horizontal line indicating page breaks. And WordStar automatically creates a backup file that is saved along with the text file, handy insurance against the accidents which sometimes occur in subsequent editing.

The WordStar design requires line and paragraph reformatting to change line

spacing from the single space default and to achieve right justification after inserting new text. Reformatting an entire document for double spacing is a tedious operation, especially since it must be done paragraph by paragraph rather than at the time of final runoff, as is the case with Apple Writer. WordStar's design balances this inefficiency by providing greater flexibility in the finished product. With this package, the user can intersperse variable spaced segments, such as a single-spaced quote, within a double-spaced document.

WordStar's flexibility is also enhanced by its ability to store custom formats or "templates" along with the text file. This permits subsequent editing of the document without having to reenter tabstops, line lengths, and other formatting characteristics that vary from default settings. In addition, one document may be printed while another is being edited. This operation, known as "spooling," has obvious advantages at deadline. Other special editing features of WordStar include vertical dashes, which may be used in ruling off matrix tables, and the capacity to place markers through the text, allowing the user to move the cursor directly to any point in the document.

WordStar supports scholarly production with a full complement of features which provides footnotes, symbols, and special characters in the text. A document can be prepared with charts, using the vertical ruler described above, with underscore, overstrike, boldface for special effects, and with superscripts for the numbering of citations in the document. All this combines with niceties such as a moveable left margin, which permits multiple-column formats and the capability of having text wrap around an illustration. Finally, WordStar provides the ability to patch alternative routines to printers and other peripherals that do not support the full range of features written into the software.

MicroPro has recently expanded the potential of its software line by introducing three new packages, SpellStar, CalcStar, and DataStar. The documentation of these new packages describes an integrated system in which statistics can be manipulated on CalcStar and DataStar then edited—complete with orthography via SpellStar—and printed with WordStar. This enables the user to manipulate statistics and then integrate tables and charts with text in writing reports on a word processor.

WordStar builds files using the entry and editing features described above. The program provides for labeling files of any length and for chaining of files as in the chapters of a book. Portions of text may be saved as separate files and then used to build new documents. WordStar files can be searched for keywords or phrases. But, this operation—like its counterpart in Apple Writer—is intended more for editing, the replacement of one word or phrase with another, than for pulling desired items from a file.

Magic Wand

- Magic Wand. Peach Tree Software. 3 Corporate Square, Suite 700. Atlanta, GA 30329. Hardware Configurations: Z80-based microcomputers, 48K RAM. Disk Drive with CP/M operating system. Cost: ca. $300.00.

As with WordStar, a document is created or edited by selecting the edit function from a main menu. The numerous edit commands are relatively straightforward and mnemonic, e.g., "BC" for copying a block of text and "T" for tabbing, and are entered from an edit status screen. Moving to the edit status screen only requires hitting the "ESCAPE" key, so having to do various editing manipulations there is not as inconvenient as it may sound. Many other editing operations, such as cursor movement; character, word, and line deletion; and find and replace, are performed using several control keys, while the text of a document is being displayed. Unlike WordStar, the text on the computer screen does not look very much like the printed form. This is because documents are formatted when they are printed, allowing for a lot of diversification without having to go back and reedit the original document. Magic Wand, however, does have a "Draft" command that displays the document on the screen in approximately the same format in which it will be printed. To aid in editing, a document may be printed from edit in raw form to check special embedded commands.

Magic Wand provides an impressive array of functions that aid in scholarly writing. Embedded recognition characters control boldface printing, hyphenation, superscripts and subscripts, and solid or broken underscoring. Formatting commands allow vertical and horizontal adjustment of the printed text; left, right, and full justification; and proportional spacing. In addition, Magic Wand supports variable line spacing, footnotes, some scientific symbols, headers and footers, and the ability to produce two-column, fully justified text. These features allow the user to produce documents in camera-ready form, an emerging requirement in scholarly publishing.

Magic Wand's powerful formatting capabilities, as described above, also expedite proposal and report writing. Other features aid in the production of reports as well as any other multipage document. Headings, footings, and page numbers can be printed on every page or only on specified pages. In addition to spooling, Magic Wand also allows two documents (files) to be edited at the same time, so that parts of one document may be included in another or blocks of text extracted from a document and used to create a new file. With this last feature, frequently used text, e.g., descriptions of services offered, may be pulled from one report and used in another or saved as a separate file to be merged with other text whenever needed. Variable tabbing aids in setting up tables, but no compatible statistical package exists at this time. As with WordStar, backup files are created automatically and file or document length is not limited by the size of the computer's internal memory—an important consideration with long documents.

For generation of forms, form letters, mailing lists, and other boilerplating applications, Magic Wand's text-merging capabilities are further enhanced by the use of variables and conditional commands. With conditional commands embedded in the text of a document and the incorporation of alphanumeric variables, a series of files may be created from one document. Values for variables may be entered from the keyboard at the time of printing, or separate data files may be set up to be merged with text files. The use of conditional commands permits text and data file merging based on operators such as equal or greater than. Thus the phrasing of a form letter may be changed to reflect variables such as the size of a donation.

Magic Wand features allow for sophisticated file creation and manipulation. While Magic Wand, like the other programs evaluated, has no truly efficient sorting capabilities, data files and conditional commands offer interesting possibilities for creating customized directories and other specialized lists. By combining search capabilities and certain types of variables, indexes to documents can be generated and stored as separate files.

To date, Magic Wand has three companion packages. Magic Spell checks for spelling errors. Magic Messenger allows documents and files to be transmitted over telephone lines. And Magic Address is available for aid in organizing large quantities of mail.

Screen Writer II

• SCREEN WRITER II On-Line Systems. 36575 Mudge Ranch Road. Coarsegold, CA 93614. Hardware Configurations: Apple II, 48K RAM, Disk Drive with DOS 3.3 operating system. Cost: ca.$125.00.

Screen Writer goes a long way toward bringing the benefits of CP/M-like word processing to Apple owners. It combines the easy operation of Apple Writer with many of the sophisticated applications described for WordStar and Magic Wand.

Screen Writer's keyboard is easy to learn with functions arranged to fit mnemonics such as "CONTROL D" for delete and "CONTROL P" for paging through a document. Documents are keyed and edited in the same mode. The package allows for flexible output such as full justification and hyphenation, variable line spacing by the use of embedded commands in the file, and templates stored with the document that provide custom formats such as line length, tabstops, and headers. It also supports extensive text changes: moves of strings of up to 32,000 characters in length and global "Find and Replace." In addition, Screen Writer contains a customized component

that allows the user to define any set of hardware—the number of disk drives, type of printer, other peripherals supported—for use with the software.

Screen Writer provides several features to support scholarly papers. It places footnotes, marked off by a special character, in a buffer for printing at the bottom of a page or at the end of the text section. It offers a stored template that automatically formats manuscripts to specifications suggested by the editors of *Writer's Market*. Screen Writer also allows the author to create up to four indexes of a document using embedded symbols that mark the terms to be indexed. However, special characters for foreign language punctuation are limited to a handful of examples and scientific symbols are practically nonexistent.

A valuable complement to Screen Writer is the compatible General Manager database management software. With these two packages, a user can store files in both systems, manipulating and sorting in the General Manager, then reformatting the information with Screen Writer. This tandem use is valuable for producing longer reports, though not the integrated statistical display package provided by WordStar-CalcStar-DataStar.

Files created on Screen Writer can be merged and searched in a variety of ways. Letter and address files combine by the use of embedded commands that provide options built by comparators, e.g., printing a letter for all persons living in a certain city or zip code. Files may also be labeled for searching by keyword annotations to produce discipline-specific printouts of serial subscriptions or new acquisitions.

Screen Writer provides a number of other features worth mentioning. It is compatible with Applesoft BASIC for easy editing or creation of programs without many of the strictures of the language editor. The edit screen may be changed from 40 to 70 columns—the 70-column screen is composed in high-resolution graphics—with a single command. This is quite handy for 40-column users who have experienced the frustration of having carefully conceived alignments destroyed by wordwrap. And finally, Screen Writer supports the spooling feature described for WordStar and Magic Wand.

CONCLUSIONS

These brief reviews in no way exhaust potential uses for word processing software in the library. Two examples will show the range of applications now emerging in our field. In a recent edition of the *RTSD Newsletter*, Marion T. Reid describes a word processor used to maintain exchange records at Johns Hopkins University.[6] And Ted Hines is currently marketing *Newsdex*, a newspaper indexing system which combines WordStar with a sorting program and several customized routines written in BASIC.[7]

A thorough evaluation should also recognize the importance of service components, especially documentation and vendor service. No matter how powerful the software, its operations must be intelligible for the user from manufacturer-written manuals. WordStar has long suffered from poor documentation, a situation partly remedied with the appearance of a revised edition of the MicroPro manual and two trade-produced pieces, *WordStar Made Easy* and *Introduction to WordStar*.[8]

Money Magazine's recent review of microcomputers concludes that the decision to purchase a piece of equipment should include consideration of the need for service.[9] Our experience suggests that the purchase of the bargain-priced software advertised in trade journals is a gamble—an image enhanced by the location of so many vendors in the state of Nevada. The importance of a knowledgeable sales staff close at hand cannot be overrated.

A final look at the four packages reviewed in this essay reveals advantages and drawbacks for each (see table 1). Apple Writer II provides a basic set of features that are well organized and easy to learn. In general, librarians themselves—not secretaries—are going to be the users of word processing software. If word processing is only a minor part of your work, the necessity of constantly relearning the com-

Table 1: Evaluation Summary

	Apple Writer	WordStar	Magic Wand	Screen Writer
Library Applications				
revisions and updates	excellent	adequate	good	good
scholarly essays	adequate	good	good	good
library reports	inadequate	excellent	excellent	good
forms	adequate	excellent	excellent	good
file management	inadequate	good	excellent	excellent
Learning Ease	excellent	adequate	good	good
Documentation	adequate	good	excellent	excellent
Companion Software	spell check	spell check database manager electronic spreadsheet	spell check communication packages	spell check database manager
Hardware, Operating System	6502, Apple DOS	Z-80,CP/M	Z-80,CP/M	6502, Apple DOS
Price	$100	$300	$300	$125

mands of more complicated packages becomes a burden. In an environment in which editing of library documents and production of essays and correspondence comprise the primary uses of a word processor, Apple Writer is perfectly adequate. However, the addition of more sophisticated word processing applications and the time to learn them tip the scales in favor of one of the other packages reviewed here.

WordStar and Magic Wand provide features far beyond those of Apple Writer. These CP/M-based systems allow wide latitude in text creation, in file manipulation, and in the ultimate formatting of finished documents. A comparison of these two packages shows minor advantages for each. Magic Wand is more mnemonic in its keystroking sequence and provides more facile manipulation of text. WordStar allows the user to augment the package's utility by patching routines similar to those Hines used to create *Newsdex*. However, MicroPro's introduction of compatible database management and spreadsheet packages, features not yet offered by Peach Tree, gives WordStar an edge over Magic Wand.

One major factor that separates Screen Writer from WordStar and Magic Wand is the hardware component. Many of us find that our libraries are already the proud owners of one or more brands of microcomputers. If Apple is your brand, as it is ours, Screen Writer offers a reasonable alternative to CP/M-based software. For though it lacks features such as a backup file and 80-column capacity, Screen Writer supports a full range of editing, merging, and file managing features. And, coupled with General Manager, it offers an integrated system of real consequence.

The introduction to this essay promised a methodology for evaluating word processing software for the library. Philip Kotler describes consumer perceptions of a particular good in terms of a bundle of utilities meeting a variety of needs.[10] This concept of bundling is implicit in our view of software selection. The performance of library tasks forms the foundation for choosing a package. Comparison at this level is relatively straightforward with anticipated use ordering advantages and disadvantages. However, the librarian-consumer also faces a range of supplementary considerations that blur the sharp edges of performance evaluation. The quality of software documentation, hardware and software already owned by the library, time for learning and retaining skills, and the availability of local-vendor services all play a role in choosing a word processing package. The weight given each of these variables is ultimately a local decision. However, our experience suggests that the choice of a particular piece of software should begin with a consideration of the full range of factors that affect selection.

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10. Philip Kotler, *Marketing Management* (4th ed.; Englewood Cliffs, N.J.: Prentice Hall, 1980), p.135. ■■

Communications

Determining the Required Number of Online Catalog Terminals: A Research Study

John E. Tolle, Nancy P. Sanders, and Neal K. Kaske

As library managers plan for the introduction of online, publicly accessed catalogs, one of the many questions they must answer is: How many terminals should be purchased to provide timely access for the user? Since a card catalog is divided into many discrete access units (file drawers), patrons rarely have to wait for access to the desired section, even during peak use periods. With an online catalog, however, the entire catalog is accessible through a single terminal that only one person can use at a time. Therefore, multiple terminals must be provided to serve users simultaneously.

The risks of incorrectly estimating the number of terminals needed are not small. Overestimating terminal requirements will increase costs; underestimating them will increase queue time and decrease customer satisfaction.

PROPOSED STUDY

To assist managers in avoiding such pitfalls, OCLC's Office of Research proposed a study to develop and test a model that accurately estimates the number of terminals required in an online public access catalog system. Based on an analysis of data from an existing system, the researchers proposed to determine whether catalog use patterns matched standard statistical distributions. If such patterns were found to exist, the number of terminals needed under a variety of conditions would be calculated using queuing models. (An example of a condition might be that a library user should have to wait no more than 30 seconds to use a terminal during peak use periods.) Additionally, the proposed model would measure reference and circulation activity and building occupancy, correlating these factors with terminal activity to determine if they might be useful predictors of terminal requirements.

SITE SELECTION

The Ohio State University Libraries were chosen as the site at which to conduct our research because: (1) the OSU Library Control System (LCS) is well established, having been in operation for a number of years; (2) the OSU Libraries use both a card catalog and an online catalog system; and (3) the OSU Libraries staff includes public service and administrative personnel interested in and familiar with online public access catalogs.

DATA COLLECTION

The research was initiated in the fall of 1981 with planning meetings, followed by library staff briefings and student training sessions. Data collection began during the winter quarter of 1981. As it was necessary to capture "peak activity," the three weeks of the heaviest patron volume (i.e., number of patrons per time period) in each of the winter, spring, and fall quarters and the two weeks of heaviest activity during the summer quarter were selected as sampling periods. Library staff tallied reference questions asked and building occupancy for all hours the libraries were open during each of the four sampling periods. Student

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John E. Tolle is research scientist, Nancy P. Sanders is research associate, and Neal Kaske is director of the Office of Research at OCLC. This communication is based on Neal K. Kaske and John E. Tolle, "Terminal Requirements for Online Catalogs in Libraries." Final Report to the National Science Foundation (Dublin, Ohio: OCLC Online Computer Library Center, Inc., June 1982).

workers hired for the purpose recorded the number of card and online catalog users, clocking the beginning and ending times of searches at the card catalog and beginning times of searches at the terminals. Ending times of terminal searches were to be determined from LCS transaction logs of system activity. (It was later discovered that user session end-times were not definitively marked on the tapes; thus, the analytical process became more complex than originally anticipated.) From circulation archive tapes, the number of borrowers and items charged were tallied. Data collection took place at five library sites: the Main Library, the Education, Engineering, and Undergraduate libraries, and the Learning Resources Center.

METHODOLOGY

Following data collection, several steps were required to determine whether standard queuing analysis could be applied to the data. Of primary importance was the determination of whether catalog user behavior fell into any pattern. If the behavior was patterned, and if the pattern matched any of the standard theoretical statistical distributions, then the queuing model based on that distribution could be applied and the number of servers determined. A data reduction step was applied to the card catalog and the terminal start/stop times to calculate interarrival and service times, the two behavioral factors that must fall into patterns if queuing analysis is to be applicable. (*Interarrival time* is defined as the time between successive patron arrivals at the card catalog or terminal; *service time* is defined as the length of time each patron uses the card catalog or terminal.) Frequency histograms of both factors were then examined visually and again with chi-square analysis to determine whether the observed data fit any of the standard theoretical distribution models, such as the Pearson Type III and the Lognormal distributions, the most likely choices. The Negative Exponential distribution, a special case of the Pearson Type III, was found to be the best general fit for the Ohio State University Libraries terminal/card catalog interarrival and service time patterns.

The match between the Negative Exponential theoretical model and the observed data would not be unexpected to an experi-

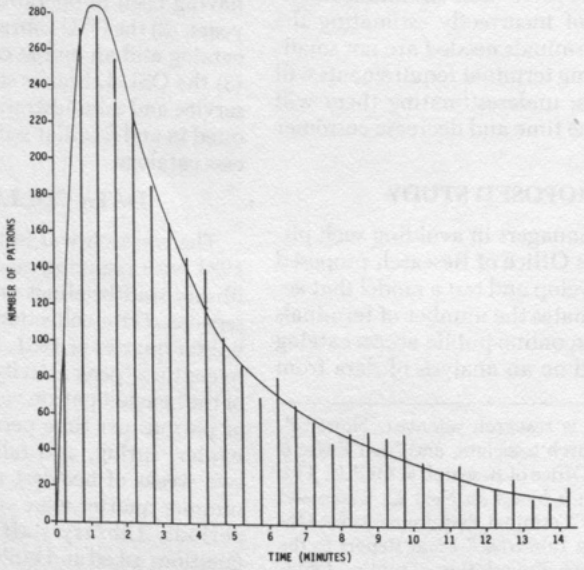

Fig. 1. Number of Patrons Served in a Given Range of Service Times at the Card Catalog in the Ohio State University Main Library, Fall Quarter 1981.

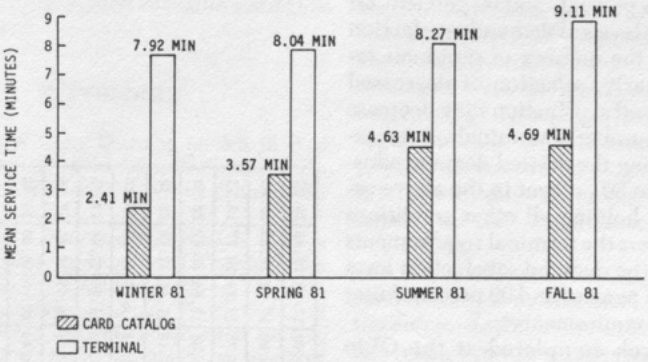

Fig. 2. Mean Service Times in the Ohio State University Undergraduate Library across All Quarters.

enced observer of patron behavior in a large and busy academic library. Graphically, the peak of observed activity occurs close to the Y-axis and then drops off quickly, as seen in figure 1. The theoretical model matches the OSU Libraries' user service times, during which most patrons used the catalogs/terminals for short periods of time (3 to 9 minutes) as shown in figure 2. The number of users dropped off rapidly as service times increased. The model was even more accurate in describing interarrival times. The highest frequency of arrivals occurred at lower interarrival times, and the frequency of arrivals dropped off quickly as the interarrival time gaps increased.

TERMINAL REQUIREMENTS PREDICTION

Having thus found that user behavior (service and interarrival times) at the card catalogs and terminals did match standard statistical distributions, the researchers employed the appropriate queuing models to predict the number of terminals needed under a variety of conditions and for a given range of service and arrival rates. (*Service rate* is defined as the number of users per specified time period and *arrival rate* as the number of user arrivals per specified time period.) Figure 3 provides an example of the table of values used to predict terminal requirements (in this case, a system for which library management has established the demand satisfaction criterion that 90 percent of the patrons should have to wait one minute or less before gaining access to a terminal).[1] The scenario to which the table applies presumes that measurement has shown patrons arriving at the catalog at the rate of 600 per hour with a mean service time of 30 seconds. Since it has been decided that 90 percent of the library online catalog users should have to wait no longer than one minute before service begins, the critical time period, "t," is one (1) minute, the figure that will be used to calculate arrival and service rates. In this example, the arrival rate has been measured at 600/hour or 10/minute, and the service rate calculated at 2/minute, since the mean service time is 30 seconds.

The next step in using the table is to calculate traffic intensity, ϱ, which is the ratio of arrival rate to service rate. In this example, the calculation is: ϱ = arrival rate/ service rate = (10 patrons/min.)/(2 patrons/ min.).

Once traffic intensity has been calculated, the last steps in the process can be completed. Using the table in figure 3, the terminal requirements are determined as follows: (1) proceed along the vertical axis to the proper service rate, i.e., 2; (2) proceed horizontally to the first traffic intensity greater than or equal to 5, i.e., 5.08; (3) drop to the X-axis to read the number of terminals that will satisfy demand 90 percent of the time, i.e., 6. The dashed directional arrows highlight the procedure used on this nomogram.

Similar tables may be constructed for other values of demand satisfaction, e.g.,

80 percent, 95 percent, and 99 percent. Of course, higher levels of demand satisfaction may increase the number of terminals required. Similarly, selection of decreased levels of demand satisfaction may decrease the required number of terminals. As an example, lowering the desired demand satisfaction level to 80 percent in the above example, while holding all other conditions constant, lowers the terminal requirements to 4. Raising the demand satisfaction level to between 95 percent and 99 percent raises the terminal requirements to 7.

The research completed at the Ohio State University Libraries is the first step in developing a standard model for determining terminal requirements in libraries. A similar study at the Dallas Public Library and an earlier study at Purdue University have shown similar arrival and service patterns and, therefore, the applicability of similar models.[2,3] Similar service patterns also were found in a study at Northwestern University.[4] We emphasize, however, that before these models can be used universally, further research at other institutions must determine whether the service and arrival patterns found in this research are generally applicable to all libraries. Until that research is completed, other libraries using these findings should do so with the understanding that the predictions will be correct only insofar as the conditions (service/arrival patterns) in their library match those of the OSU Libraries. Libraries already collecting such data or desiring to replicate the study are encouraged to communicate with the OCLC Office of Research.

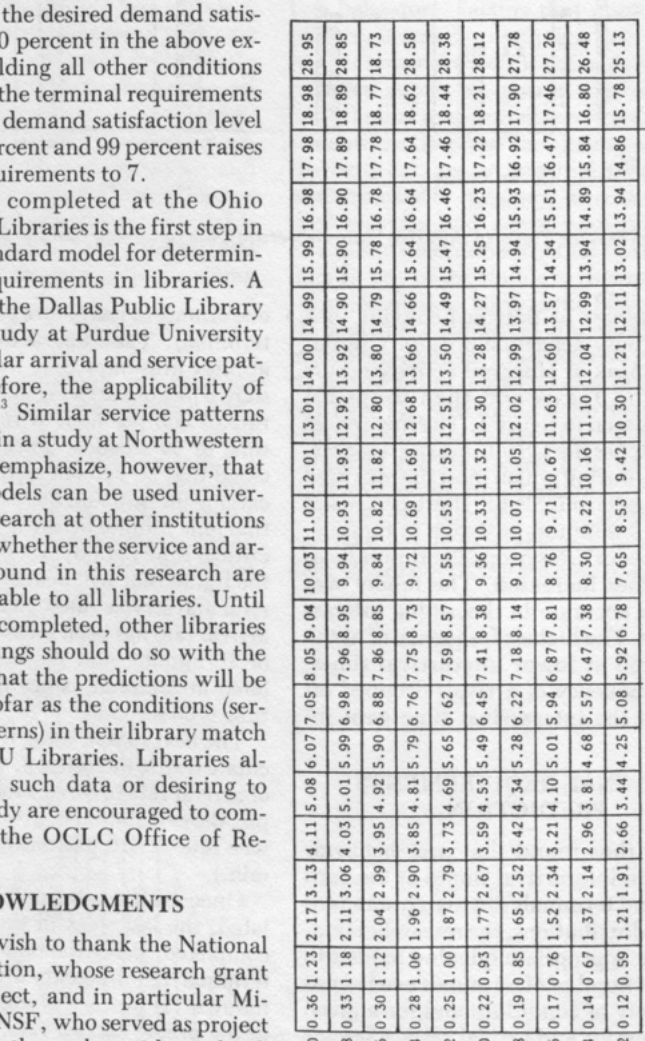

Fig. 3. Required Number of Terminals to Satisfy 90 percent Demand with Patron Delay Less Than Time t.

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members who provided valuable assistance to this project.

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Security and Automated Library Systems: A Ticking Time Bomb?

Joseph R. Matthews

Imagine an automated library system, e.g., a circulation system or an online catalog, that has been installed in a library for several years. Retrospective conversion has been completed and the majority of manual card files have been abandoned and discarded. The library director and professional staff members are nicely coping with the online system and wondering how they managed with the prior manual systems and catalogs. Due to the flood of visitors, a regular visitors' day has been established. A sense of accomplishment, pride, and peace is felt by all the staff members. But, is this sense of security well founded?

Consider:

- An accidental fire in the computer room is caused by electrical components in the computer short-circuiting and catching fire when a power surge occurs as the result of a nearby lightning strike. There is no fire alarm or automatic fire suppression unit and so the fire rapidly spreads. It is only luck which prevents the library from being totally destroyed when a passerby notifies the fire department. The resulting damage runs several million dollars.
- A library, which recently installed an automated library system, is showing off their new system to a group of influential

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citizens. A teenager accompanying the group has accidentally left a magnet in his rear pocket. Bored, the teenager sits down on the computer room desk, next to the OCLC archive tapes waiting to be loaded into the computer. The power of the magnet erases the data on one side of all three tapes. The tapes are thus rendered useless.

- A disgruntled library patron, the recipient of a number of overdue notices, who only six months previously had been released from a mental institution, follows the attractive signs to the computer room. The patron enters the unlocked room and leaves a package. Several hours later the package explodes and totally destroys the computer room and all its contents. Damages exceed $1 million and the library is without its computer system for nine months.
- During the night the area surrounding the library is drenched in a sudden thunderstorm. The drain near the library's loading dock becomes clogged with autumn leaves. Upon entering the library the next morning, staff members discover the first floor of the library, including the computer room, under four feet of water.
- A budding mail order entrepreneur enters the unlocked computer room and borrows every available magnetic tape in an effort to build a "cheap" mailing label database.
- A modern day Luddite uses an axe to smash the computer and rotating disk drives. After detention by library staff members, he is arrested by police. His excuse is that he is saving the citizens of his city from the corrupting spread of the computer.
- A teenager discovers she is able to take control of the computer system using the dial-in modem provided by the library to allow patrons with personal computers to gain access to the library's catalog. She quickly starts a commercial time sharing business and uses the library's computer during the early morning hours from midnight to six in the morning. The automated system is thus unable to run backup programs and generate overdue notices, which forces the library to complete these functions after the library is open each morning. The business runs undetected for more than five months.

Are these brief scenarios rejected plot summaries from the "Twilight Zone" television series, or do they contain more than a kernel of truth? Impossible situations you say. Perhaps, but perhaps not.

The investment made by a library in an automated system is considerable, regardless of the size of the computer system. Total costs for a library to purchase a computer system may range from one hundred thousand dollars up to the millions of dollars for larger libraries. And the costs involve more than the purchase price of the system as illustrated in table 1.

One cost component often overlooked by libraries are the costs associated with creating and maintaining several machine-readable databases. Given the labor involved, the costs for a complete retrospective conversion project may range from $1.50 to more than $3.00 per title. Thus for a library with 250,000 titles, a machine-readable bibliographic database may have cost between $375,000 and $750,000 to create. The size of these numbers reflect a not insignificant investment, and yet the majority of libraries with automated library systems give little or no attention to the issue of security for the computer system. The fact that a library should devote some attention to the security of its automated library system would only seem to be a prudent course of action.

As an illustration of the seriousness of the problem, consider a recent U.S. Department of Commerce report on white-collar crime that estimates that less than 1 percent of computer crimes are ever detected, and then usually by accident. The most serious computer crimes are theft and manipulation of data that result in the theft of money, goods, or services. Name and address files are particularly attractive. Computer abuse is almost equally divided between unauthorized data manipulation during authorized use and unauthorized computer use. Typically computer crimes (1) do not require a high degree of sophistication, (2) are the result of a lack of controls rather than the failure of adequate security measures, and (3) are usually *not* performed by programmers. Given the substantial financial investments made by li-

Table 1. Possible Cost Components

First Year Costs
Consulting Assistance
Consulting Fees
Staff time spent with the consultant
Hardware
CPU Hardware, including operator console, cabinets, cabling, etc.
Tape Drive, including controllers, cabling, etc.
Line Printer, including controller, cabling, etc.
Disk(s), including controllers, cabling, etc.
Disk Packs
Terminal Devices
CRT including cabling and connectors
CRT with wand, including cabling and connectors
Other, e.g., printers
Portable terminal
CPU communications equipment, e.g., ports, cabinets
Modems/Multiplexors, including cabling and connectors
Software
Operating System
Database Management System
Other System Software
Circulation System, including Reserve Book Room and Materials Booking
Online Public Catalog
Acquisitions and Acquisition Accounting
Staff
Computer Operator(s)
System Manager
Trainers
Database
Creation of the Database (Retrospective Conversion)
Other
Training
Documentation
Supplies
Installation
Shipping and Insurance
Performance Bond
Loading the Database
Labels
Installing Communication Lines
Continuing Annual Costs
Maintenance
Hardware
Software
Communication Equipment
Communication Lines
Supplies
Labels
Operating Costs (electricity, etc.)
Staff
Database Maintenance
System Replacement/Upgrade Reserve Fund

braries for automated systems *and* the potential high costs of recovering from an accident or a computer abuse incident, libraries should be doing more in the security area.

The most well known library computer abuse incident involved data entry at the New York State Library, which employed an individual who entered obscenities into the OCLC database. Prior to being detected and terminated, the individual entered "choice" words in three records. The employee was entering records as part of a retrospective conversion project. Once one affected record is found, the inevitable question arises, "How many more records with obscenities are there?" To determine the number of affected records, the state library ordered a special tape from OCLC that contained approximately 200,000 records. The library wrote a special program that looked for "choice" words and after processing the 200,000 records the library verified that only three records contained the obscenities. The library was able to prove with their time sheets who worked on what terminals at what times. With the assistance of OCLC, the state library was able to determine what terminal and at what times the records were input—even though the employee used another employee's authorization number. The employee was fired and asked to leave the premises at once. The employee appealed and the dismissal was upheld through an administrative hearing with the former employee represented by legal counsel.

Donn Parker at the Stanford Research Institute suggests that only about 5 to 10 percent of the computer abuse incidents are ever publicly acknowledged. Yet, he reports that there are almost 900 reported cases of computer abuse since 1958.[1] This suggests the need for more effective security measures in libraries with automated library systems.

Measures that can be taken to improve the security of a computer system fall into four categories: (1) Physical Security, (2) Access Control, (3) Hardware and Software Security, and (4) Personnel Security.

Physical Security is concerned with the room in which the computer is housed, the physical location of the computer in the

building, fire prevention and detection, temperature and humidity control, and the provision of electrical safeguards. Physical security is the foundation upon which all computer installation security plans are built.

Access Control is concerned with both physical constraints and control procedures used to improve the security of the automated library system. Only those persons with a real need for physical access should be allowed to enter the computer room. All library employees should wear identification badges. Staff members will feel more encouraged to challenge an unbadged stranger after receiving appropriate education about the need for security from top management.

Hardware and Software Security measures involve protecting the computer system against tampering, manipulation, or undetected mechanical failure. For example, some terminals may be allowed to perform inquiries into the database but are prevented from changing any data. Other terminals or employees may be prevented from performing various functions through the use of restrictions and passwords. A data entry clerk would be allowed to enter cataloging and item related information but not to find out (and forgive) a patron's fines. Unless passwords are changed relatively frequently, the measure of safety provided by passwords will rapidly diminish. Obviously passwords and access codes should never be written on a slip of paper and taped to a terminal for convenient access. In addition, passwords should never be shared by employees.

Personnel Security is concerned with the hiring, training, and termination procedures of employees having access to the automated library system. When an employee resigns or is dismissed, the employee should be asked to leave immediately after turning in all materials and identification. This will help eliminate possible grudge actions on the part of the departing employee. In addition, the actions of employees at terminals should be periodically monitored. The library employee entering obscenities into the OCLC database might have been identified sooner with a monitoring or sampling program.

A SECURITY ACTION PLAN

What are some steps that can be taken to improve the security of your library's automated system?

First, a review or risk analysis should be made to determine the levels of security or lack thereof of your present computer system. An Automated Library System Security Checklist has been included in Appendix A to facilitate this review. This review can be completed by a staff member, preferably not someone directly associated with the computer, or with the aid of a consultant.

Second, once the security review has been completed the results indicate what areas need improvement. The likelihood of a threat or problem should be listed in order of probability. For example, the threat of a power surge and a power failure, as a result of a lightning strike, is considerably higher in Florida—the lightning-strike capital of the U.S.—than in some other states. With the list in hand, you should estimate the economic impact of each threat. These economic impacts are then compared to the worth of the computer system and database—the asset value to be protected. The list of threats then can be reordered so that those with the greater probability of occurrence and those threats that would cause greater damage are placed on top.[2]

Determine the cost of a particular security measure. Often significant security improvements can be made for small dollar investments. However, other possible changes may require a large investment. Each potential security change should be evaluated and the cost of the security improvement balanced against the amount of added security to be gained.

Third, if a Library Computer System Disaster Plan is not now in existence, one should be formulated and documented in writing.[3-6] A disaster plan should spell out who is to be contacted in the case of an emergency or disaster and each individual's course of action and area of responsibility should be specified. A dry run emergency or disaster dress rehearsal should be conducted once a year and the disaster plan procedures improved based on problems encountered during the dress rehearsal.

Any changes in the disaster plan procedures should be reflected in the document itself. In addition to the notification procedures, the disaster plan should identify possible backup facilities and contain a detailed plan for removal of critical documents, disk packs, and magnetic tapes.[7]

The age-old adage, "An ounce of prevention is worth a pound of cure," is certainly applicable for automated library systems. The time to conduct a security audit and use the Automated Library System Security Checklist is NOW!

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APPENDIX A
AUTOMATED LIBRARY SYSTEM SECURITY CHECKLIST

This checklist indicates topics to be examined during a security evaluation of the automated library system. After completing the checklist, consider each "No" in detail to see if it indicates a weak spot in your security safeguards. Changes are adopted and implemented after weighing the cost of the particular security item and the increased security the item will bring.

PHYSICAL SECURITY

Location:	YES	NO
Is the computer located away from airports (radar interference and glide paths)?	____	____
Is the computer located away from heavy truck traffic?	____	____
Is the computer located above flood levels?	____	____
Building:		
Is the computer room constructed of fireproof materials?	____	____
Are the computer room walls fire-rated at one hour?	____	____
Is the computer located in center of building away from windows?	____	____
Are all utility outlets sealed?	____	____
Is the computer located away from vibration sources?	____	____
Is there adequate drainage?	____	____
Is shielding for electromagnetic radiation necessary?	____	____
Is the ceiling crawl space closed to the computer facility and library?	____	____
Are locks changed periodically and when an employee leaves?	____	____
Temperature and humidity control:		
Is the air conditioning system independent from rest of the building?	____	____
Are two or more smaller air conditioning units (preferred) installed?	____	____
Has the library considered 100 percent backup for the air conditioner?	____	____
Will the air conditioning ducts automatically close if smoke is detected?	____	____
Is the air temperature/humidity chart monitored regularly?	____	____
Are the air intakes located away from sources of dirt, dust, sand, and steam?	____	____
Electrical power:		
Does the computer room have priority over rest of building if limited amount available?	____	____

	YES	NO
Have you considered alternative sources of power including generators?	___	___
Are there battery-operated emergency lights?	___	___
Fire protection:		
Are fire prevention techniques discussed and implemented?	___	___
Is there a direct fire alarm line to the fire station?	___	___
Are all wiring, pipes, and ducts grounded?	___	___
Are there centrally located emergency power-off switches?	___	___
Are there waterproof covers for equipment in case of a fire?	___	___
Do you have smoke and heat detection alarms installed?	___	___
Does your water sprinkler system have wet lines? Dry lines, which are activated and filled when temperature reaches a certain point, provide safeguards against accidental baths.	___	___
Are the computer room fire sprinklers separate from those installed in the rest of building?	___	___
Are fire retardant trash cans used in the computer room?	___	___
Are paper supplies not stored in the computer room?	___	___
Are there hand-held Halon fire extinguishers in the computer room?	___	___
Has staff been trained to use the fire extinguishers?	___	___
Have you held a fire drill this year?	___	___
Are emergency telephone numbers (fire department, police, ambulance, equipment repair, turnkey vendor, computer manager, library director) clearly posted near the phone?	___	___
Has a total Halon fire suppression system been considered?	___	___
Media (tapes, disks, cards, documentation) protection:		
Do you have a safe-within-a-safe with insulation?	___	___
Is the safe rated for 2 hours at 150°?	___	___
Is the safe large enough for copies of tapes and disks considered "vital?"	___	___
ACCESS CONTROL		
Physical arrangements:		
Doors:		
Are all doors locked and equipped with crash-bar door alarms?	___	___
Is the main entrance tightly controlled with key or combination lock?	___	___
Windows:		
Have windows been eliminated?	___	___
Are windows and doors sufficient to prevent burglary and unauthorized access to the computer?	___	___
Control procedures:		
Do all employees wear identification badges?	___	___
Is access to the computer room denied to all but those who have a need to enter?	___	___
Are maintenance people always supervised when inside the computer room?	___	___
Is there limited access to computer, programs, operating system, documentation, and specialized forms (i.e., checks)?	___	___
Are tours of the computer room discouraged (photos will do nicely)?	___	___
Is there proper disposal of computer output, punch cards, manuals, etc. (shredder may be necessary)?	___	___
Is there a financial audit trail report and do the accounts balance each day?	___	___
PERSONNEL SECURITY		
Hiring:		
Is a prospective employee's technical competence verified?	___	___
Do you check with prior employers and references?	___	___
Do you perform a background check on all computer personnel?	___	___
Is there sufficient space on application form to list prior addresses?	___	___
Are staff bonded?	___	___

Retaining and training:	YES	NO
Are computer security policies in writing so employees know what is expected?	____	____
Are employees advised of management's dependency on them for security?	____	____
Is there a security educational program?	____	____
Is access authorization revoked for disgruntled employees?	____	____
Termination procedures:		
Are all identification and materials turned in immediately?	____	____
Does the departing employee leave premises at once?	____	____
Are locks, combinations, and passwords changed when an employee leaves?	____	____
HARDWARE AND SOFTWARE SECURITY		
Preventive maintenance:		
Is there a periodic check to determine if tampering with equipment has occurred?	____	____
Are there frequent validity checks of equipment?	____	____
Software:		
Are passwords changed at random intervals?	____	____
Does the computer generate a report warning of repeated attempts to use invalid passwords?	____	____
Do all accounting programs have an easy-to-trace audit trail?	____	____
Do you keep the source code safely locked away to prevent unauthorized program modifications?	____	____
Are data backup procedures carefully followed and executed on schedule?	____	____
Do you conduct an annual security audit?	____	____
Are computer operators required to keep "Trouble Logs?"	____	____
Do supervisors regularly review Trouble Logs, equipment use meters, etc.?	____	____

■■

SOLOS: A Student-Oriented Information Retrieval System Using MARC Records

Brett Kessler and Debora Shaw

INTRODUCTION

Online information retrieval and the MARC format are important subjects for students of library automation. At the same time these are among the more difficult topics to understand without hands-on experience. Exercises with utilities such as OCLC and Dialog are invaluable, but cost factors or limited access to dedicated terminals may discourage sufficient practice time, and the instructor has little control over the range of features available. For these reasons, SOLOS, the Student-Oriented Library On-Line System, was developed at Indiana University for the School of Library and Information Science. SOLOS is a demonstration information retrieval system that works on a data file of MARC records. Its capabilities include the following:

- Search for any word in any specified field or subfield of the MARC record
- Optional decoding of any coded data, so that the geographic area code *a-cc-ti* in field 041, for example, can be searched as *Asia*, *China*, or *Tibet*
- Flexible display formats that parallel searching capabilities
- Full Boolean search capabilities
- A variety of matching methods in searches, including term truncation
- Interactive operation with fast response time

BACKGROUND AND IMPLEMENTATION

Student-oriented systems have been developed at various library schools, but each has had design goals that differed from ours in some respects. An early development was the Library Education Experimental Project (LEEP) at Syracuse University,[1] which was a sophisticated batch-access laboratory rather than a single online program. More recently, the XMARC system was created at the University of Chicago.[2] XMARC has strong searching capabilities, which it achieves by allowing programmers to write new subroutines in PL/I. SOLOS aims for a more general audience by letting its users try out a variety of built-in search techniques. DIATOM at Syracuse[3] and Drexel's IIDA[4] introduce novice searchers to Dialog. While these provide excellent low-cost training for that system, SOLOS was intended as a broader educational tool to encourage students to explore the MARC format and a wider variety of searching operations.

The SOLOS data file was taken from the Indiana University Libraries OCLC subscription tape for November 1980. All records for monographs and serials in the Library of Congress classifications D, E, and F were copied, providing a data file about a single subject, history, and containing a reasonable number of records, 1,018. These are stored as variable-length records in the MARC communications format. Special programs generated two indexes, the first a list showing for each record number the location of the corresponding record, the other a concordance for each word and number in every indexed field. These indexes permit the SOLOS program to answer most queries almost instantly.

Other tables, which were entered manually, give the English decoding of the MARC language codes, geographic area codes, country of publication codes, and the OCLC symbols for the various libraries in the Indiana University system. With this information, SOLOS can optionally search or print coded fields using their spelled-out equivalents, for example, India instead of ii.

Records in the database cannot be deleted or changed, nor can new ones be added. SOLOS is dedicated to information retrieval; allowing students to change the data file would complicate the design and

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make it difficult to evaluate searching assignments.

SOLOS resides on a PR1ME minicomputer. It can be accessed at 300 or 1200 baud by telephone link or via the University's coaxial cable network, so that the student can work on campus or from a terminal at home. If a terminal does not have a printer attached, a transcript of the student's work session can be printed offline on one of several line printers.

SOLOS SEARCHING AND PRINTING FEATURES

Command structure. Any system that makes full use of the complicated MARC record is bound to be somewhat complex itself. A good deal of information must be conveyed to the computer in order to select the desired matching modes and fields for searching and printing. One approach would be to use defaults unless explicitly overridden in a search command, but this could require long commands for queries that violate many assumptions. Furthermore, when several queries in a row override defaults in the same way, a user will have to type the same information each time, a process that can be annoying and lead to typing errors.

SOLOS takes the other approach, breaking down a query into its logical components. Its three central commands are:

SEARCH, which looks for the word, number, or phrase given in the command.

PRINT, which displays the records whose numbers are given in the command.

MODIFY, which specifies all information for SEARCH or PRINT other than the string to be searched or the number of the record to be printed. These specifications remain valid for all SEARCH or PRINT commands until another MODIFY command changes them. When one logs into SOLOS, the most useful SEARCH and PRINT options are selected as defaults.

Another issue is whether a system should be menu-driven, for the benefit of users not completely familiar with the options available, or command-driven, so that expert users need not be inconvenienced by several screens of information. Some systems let the user choose between a command mode and menu mode, but SOLOS resolves the problem without resorting to two different modes of operation: the user can anticipate menus, answering questions before they are asked. Since the answer to each question is a meaningful word or number, the anticipated answers stacked on one line have the appearance of a discrete command.

One further convenience that makes entering commands less cumbersome is that each command word, except for field names, can be abbreviated up to the initial letter. This and the features discussed above are illustrated in figure 1. The user's input is on lines that begin with the SOLOS prompt, which is a colon or a number plus a colon. The program accepts input in upper- or lowercase; uppercase is used here to contrast with the computer's responses.

Fields. For searching or display, fields can be specified in two ways. Students of the MARC record can give the three-digit field tag. They can narrow the request by requiring specific indicators or a specific subfield within a field. They may also indicate which positions they wish to search in the field, such as characters 18-21. This ca-

```
1: SEARCH WEIMAR
4 records found.

2: PRINT 1
short:                    Main Lib.
                          DD240 .R4
                          Die Republik von Weimar / Jens Flemming ... [et
                            al.] (Hrsg.).
                          Orig.-Ausg.
                          Kronberg/Ts. : Athen^aum-Verlag ; D^usseldorf :
                            Droste, 1979.


2: S CZECHOSLOVAKIA
11 records found.

3: P 1
short:                    IU S.E.
                          DK67.5.C9 V34
                          Valenta, Jiri.
                          Soviet intervention in Czechoslovakia, 1968 :
                            anatomy of a decision / Jiri Valenta.
                          Baltimore : Johns Hopkins University Press, c1979.


3: MODIFY
Which behavior do you wish to view or change?
  print  How records are displayed by print commands
  search How records are searched
  all    See complete status
  !      None: return to search mode
: PRINT
Which printing behavior do you wish to view or change?
  fields      Which part(s) of the record get printed
  set         Which retrieval set the record number requests refer to
  characters Which character set is used
  all         See complete print status
  !           None: return to top level
: S
Currently print requests refer to the last retrieval set, 2 (1-11)
Which retrieval set would you like to look at?
Enter the number of the set, or 0 to refer to the entire data base
Or " to see and keep current state, ! to exit
: 1
There are 4 records in set 1

3: P 1
short:                    Main Lib.
                          DD240 .R4
                          Die Republik von Weimar / Jens Flemming ... [et
                            al.] (Hrsg.).
                          Orig.-Ausg.
                          Kronberg/Ts. : Athen^aum-Verlag ; D^usseldorf :
                            Droste, 1979.
```

Fig. 1. SOLOS Command Structure Example. User Input in Uppercase.

pacity is useful when searching the fixed fields or the record leader. It is also possible to specify a part of the record broader than a single field, by leaving one or more of the tag digits "wild." One can even leave all three digits wild, requesting for instance subfield x, regardless of the field in which it appears. The display in figure 2 which, like all figures, continues the previous one, illustrates some of these features. The exclamation mark shown in both of the commands requests default values of all characteristics not yet specified.

The other way to specify a field is by the English name that SOLOS assigns to it. Some of these names correspond directly to a MARC field, such as *note-general* for tag 500, and so differ from the MARC tag only in their mnemonic value. But most of the names are either narrower or broader than a MARC field. *Date1* is only four characters from the 008 field, whereas *title* pulls together some two dozen fields or subfields (subfields a and b of the title/responsibility statement 245, all variant title fields, analytic titles, series statements, and so forth).

Another characteristic of mnemonic field names is that codes are not searched or printed as they appear on the MARC record, but are first interpreted. Thus the field named *text-language* is not the three-character code in the fixed field but the English name of the language. Like the field names, these are easier to remember than arbitrary two- or three-letter codes.

Searching. SOLOS contains a dictionary of all the Library of Congress subject headings used in the SOLOS records, along with an indication of all related subject headings found in the database, and references from

unused synonyms. Searching this dictionary, which in SOLOS is loosely called a thesaurus, helps the user to find all headings that apply to a topic of interest, as in figure 3.

The SEARCH command, which matches against the MARC data file, is more flexible. All records that satisfy a search query are entered into a numbered retrieval set and can be displayed with the PRINT command. Users combine two or more retrieval sets in union mode (inclusive OR), intersection mode (AND), or subtraction mode (NOT), the three most-used components of Boolean logic. A search can also be performed on the records in a specific retrieval set, equivalent to combining two sets in intersection mode, but much faster. Figure 4 illustrates the Boolean operations. As defined in figure 1, retrieval set 1 contains 4 records with the word *Weimar*, and set 2 contains 11 records with the word *Czechoslovakia*.

Searching is possible on any field or subfield, MARC or mnemonic. More than one field can be searched at a time, in which case the query is satisfied if the word searched is found in any of the fields. All fields are indexed except for some of marginal interest, such as the "main entry in body of entry " indicator, and those normally useful only for display, such as the collation. These indexed fields, which together have the mnemonic *indexed*, can be searched instantly, and the program assumes the user wants to search all indexed fields until a "MODIFY SEARCH FIELDS" command tells it otherwise.

```
3: MOD PR SET 2
There are 11 records in set 2

3: MODIFY PRINT FIELDS REPLACE
How do you wish to specify the field?
  external  Mnemonic names
  internal  MARC format elements
  ! to not add a field after all
: INT
Enter 3 characters defining field tag (any/all may be X = "any")
: 245
Enter 2 characters specifying what indicators the field must have
Either or both may be - standing for anything
: --
Enter one character if you wish only that subfield, else -  for entire field
: A
Which is the 1st character position you wish?
Count the 1st position as 0
: 0
Which is the last character position you wish (counting from 0)?
Enter "end" to get up to the end of the subfield
: END !
245!a all instances. Exclude tag&indicators
Do you wish to:
  add  Add another specification
  stop Leave specs as they are
: STOP

3: P 1-2
245a:                    Soviet intervention in Czechoslovakia, 1968 :

245a:                    Czechoslovakia's role in Soviet strategy /


3: MODIFY PRINT FIELDS INSERT-BEFORE: INTERNAL 1XX! KEEP-NEXT-FIELD STOP
1XX all instances. Exclude tag&indicators

3: P 1-3
100:                     Valenta, Jiri.
245a:                    Soviet intervention in Czechoslovakia, 1968 :

100:                     Kalvoda, Josef, 1923-
245a:                    Czechoslovakia's role in Soviet strategy /

110:                     Bohemia. Laws, statutes, etc.
245a:                    Codex Ferdinandeo-Leopoldino-Josephino-Carolinus:
                           pro haereditario regno Bohemiae, ac ...
                           marchionatu Moraviae, et ducatu Silesiae :
```

Fig. 2. Specifying Fields by MARC Tags.

```
3: THESAURUS WARFARE
Aerial warfare
  USE Air warfare
Air warfare
  BT  Military art and science
  BT  Strategy
  RT  Atomic warfare
  UF  Aerial strategy
  UF  Aerial tactics
  UF  Aerial warfare
  UF  Air strategy
  UF  Air tactics
Atomic warfare
  BT  Military art and science
  BT  Strategy
  NT  Atomic bomb
  RT  Air warfare
  UF  Nuclear warfare
Nuclear warfare
  USE Atomic warfare
Unconventional warfare
  USE Subversive activities
```

Fig. 3. Searching the Subject Heading Dictionary.

For instructional purposes, SOLOS permits many modes of searching which cannot easily be performed by looking in the index. The program performs such searches by directly searching each record in the data file. Such a search would be extremely time-consuming with a full library catalog, but the smaller size of the SOLOS data files makes the time tolerable. Such exhaustive searches through a small retrieval set may be much quicker. The program estimates when searching will be exceptionally slow, and gives the user a chance to withdraw the request.

SOLOS assumes that a user normally wants to search for individual words. When more than one word is given in a query, SOLOS looks for records that contain all the specified words, in any order. One can modify this behavior, so that multiple words are searched as an inseparable phrase, which gives more specific results. With the SOLOS data file, the normal search for "war and peace" retrieves six records having these three words in them, whereas the search for the *phrase* "war and peace" fails.

SOLOS normally assumes that the user is looking anywhere in a field for whole words. Left- or right-truncation is accomplished by beginning and/or ending a word with a question mark. While *america* matches only *America, america?* matches also such words as *American* and *Americans.*

One may specify how the characters in the search query are matched against the records. SOLOS normally ignores differences in capitalization, punctuation, and diacritics, but two more exacting options are available. One ignores distinctions that cannot be adequately represented on standard ASCII terminals (such as the difference between the two *L*'s in Polish), while the other matches every character exactly, with no exceptions. These three matching modes are implemented by having the program transliterate queries and MARC fields into one of three character sets. The same three character sets are used for display, so some insight into the process can be had by referring to figure 6 and the discussion of character sets in the section on printing below.

It is possible to compare numerals not as strings of digits but as arithmetic values, so that *7* matches *007*. The user may also search for numbers less than or greater than a particular number.

Printing. The examples have shown how the user can print any record in the data file or a retrieval set by giving its relative number, and how the user can specify which fields should be printed. The default format, called *short*, appears in figure 1. Another format, *full*, displays all of the information in the record that a library patron is likely to find meaningful and nonredundant (see figure 5). For students of the MARC record, *oclc* gives the record in a format similar to the OCLC display, and the *dump* command displays the record as it appears on the MARC tape.

SOLOS provides three character sets, illustrated in figure 6. The default for printing, called *ascii*, shows records as best they can be displayed on standard ASCII terminals which cannot handle the special characters of the MARC character set. Diacritics are uniformly printed as ^ or _ depending on whether they appear above or below a letter, and other modified letters are printed as their nearest equivalents, such as *oe* for the French digraph. A more precise

```
3: COMBINE
Which records do you wish to put into set 3?
  union     Those found in any or all of the sets to be specified
  intersect Only those which sets to be specified have in common
  diff      Those found in one set but not 1 or more others
  !         None: return to top level
: INTERSECT
Enter the numbers of the sets you wish to intersect.
If you type the set numbers on separate lines,
I will display the size of the new set after each intersection.
Otherwise separate the numbers by a space, not commas or hyphens.
When you have finished, type "stop"
: 1
4 records in new set.
Enter next set number, or type "s" to stop
: 2
1 records in new set.
Enter next set number, or type "s" to stop
: S

4: MODIFY PRINT FIELDS REPLACE EXTERNAL SHORT DELETE-NEXT-FIELD STOP

4: PRINT 1
short:                    IU Bloomington, in-house item
                          DB215.2 .C35 1978
                          Campbell, F. Gregory.
                          Confrontation in central Europe : Weimar Germany
                            and Czechoslovakia / F. Gregory Campbell.
                          Chicago : University of Chicago Press, 1978, c1975.


4: COMBINE UNION 1 2
14 records in the new set.
Enter next set, or type "s" to stop
: S

5: COMB DIFF 1 2
3 records in new set.
Enter new set number, or type "s" to stop
: S
```

Fig. 4. Boolean Operations.

character set, *coded*, gives a unique, if at times necessarily arbitrary, representation to every MARC character. This may result in a less natural display, but it allows the student to identify the exact contents of a record even on ASCII terminals. A third set, *lexical*, displays data in uppercase, without punctuation or diacritics. Such a display is of limited aesthetic value, but helps the student to understand the system's search procedures, since normally search queries and the fields searched are converted into this format before they are compared. *Ascii* and *coded* correspond to the other two matching options discussed in the section on searching.

USE OF SOLOS

SOLOS has been used for three semesters in the required course, "Introduction to Information Science." Exercises on SOLOS accompany lectures on information retrieval and on the structure of the MARC record.

The students' first set of exercises are designed to increase their appreciation of the power of the MARC format. Performing searches on specific fields gives them a chance to experience the usefulness of tags for narrowing the domain of a search. They use MARC tags when searching for answers to such questions as:

- How many items in the data file have a note indicating that they contain maps? How many items are coded for maps in the fixed field?
- Which items have a secondary author named *Smith*? Modify the short form printing format to include added entries, then print all the records retrieved.
- How many items are more than 28 centimeters tall?

Exercises that emphasize information retrieval techniques are designed primarily to make students familiar with Boolean operations and the syndetic structure of the subject headings. Students are encouraged to use mnemonics for groups of MARC fields, such as *author*, *title*, and *subject*, when answering such questions as:

- Find items on wars in the twentieth century.
- Find all materials about any part of Asia, not written in Chinese or Russian.

To answer the first question many stu-

```
6: MODIFY PRINT FIELDS REPLACE EXTERNAL FULL STOP

6: P 1
full:
  tp:                  Die Republik von Weimar / Jens Flemming ... [et
                         al.] (Hrsg.).
  edition:             Orig.-Ausg.
  imprint:             Kronberg/Ts. : Athen^aum-Verlag ; D^usseldorf :
                         Droste, 1979.
  collation:           2 v. ; 19 cm.
  contents-note:       Bd. 1. Das politische System.--Bd. 2. Das
                         sozial^okonomische System.
  holdings:            ... v.1   Main   879180
                       ... v.2   Main   879180
  bibl-note:           Includes bibliographical references.
  subject:             Germany--Politics and government--1918-1933.
                       Germany--Economic conditions--1918-1945.
                       Germany--Social conditions.
  lccn:                79396571
  nat-bibl-no:         GFR79-A(v. 1)
  isbn:                3761072244 (v. 1):
  cat-libr:            DLC DLC IUL
  area:                EUROPE
                       Germany
  branch:              Main Lib.
  lc-class:            DD240 .R4
  ddc-no:              943.085
  series:              Athen^aum-Droste-Taschenb^ucher ; 7224 : Geschichte
  added-entry:         Flemming, Jens.
```

Fig. 5. "Full" Display Format.

```
6: MODIFY PRINT SET 0
There are 1018 records in the data base

6: MODIFY PRINT FIELD REPLACE INTERNAL 245! STOP
245 all instances. Exclude tag&indicators

6: PRINT 25
245:                   Razvit^ie postoi^annykh reguli^arnykh arm^i^i i
                         sostoi^an^ie voennago iskusstva v vi^ek
                         Li^udovika XIV i Petra Velikago / General-Maior
                         Puzyrevsk^i^i.

6: MODIFY PRINT CHARACTERS CODED

6: P 25
245:                   Razvit^-ie posto^(i^)annykh regul^(i^)arnykh
                         arm^-i^ui i sosto^(i^)an^-ie voennago iskusstva v
                         v^(i^)ek L^(i^)udovika XIV i Petra Velikago /
                         General-Maior Puzyrevsk^-i^ui.

6: MODIFY PRINT CHARACTERS LEXICAL

6: P 25
245:                   RAZVITIE POSTOIANNYKH REGULIARNYKH ARMII I
                         SOSTOIANIE VOENNAGO ISKUSSTVA V VIEK LIUDOVIKA
                         XIV I PETRA VELIKAGO GENERAL MAIOR PUZYREVSKII
```

Fig. 6. SOLOS Character Sets.

dents searched the subject headings dictionary for headings that include the word *war*, and all related headings, then searched the data file for all records containing these headings. The second question tests knowledge of Boolean operators. Finding items about any part of Asia is the least difficult part of the question, since in searching field *subject* each of the five levels of the geographic area codes is separately decoded. Any region in Asia has a code beginning with *a* and will therefore match the query *Asia*.

SOLOS has proved a valuable addition to the "Introduction to Information Science" course. The availability of a sophisticated, library-oriented search system at no cost has intrigued students. They have enjoyed experimenting with the variety of search techniques and with the development of search strategies. The opportunity to gain an extensive familiarity with the

MARC format is of particular interest to students with previous experience in online cataloging and to practicing librarians. The fact that SOLOS supports work both with the specifics of the MARC format and with information retrieval functions has expanded emphasis on and interest in these topics.

SYSTEM REQUIREMENTS AND AVAILABILITY

SOLOS is written in Pascal, with a few Fortran routines for reading files in direct access mode. The program is 307K bytes in size, with 2.2 megabytes of auxiliary data files, and runs on a PRIME 750 superminicomputer under the PRIMOS virtual memory operating system. Tapes or printouts of the programs and tables can be made for interested educators. Please contact Debora Shaw, Indiana State Library, 140 North Senate Ave., Indianapolis, IN 46204.

ACKNOWLEDGMENTS

The authors wish to thank Dr. Stephen Harter, who commissioned SOLOS and encouraged its use in the school. Dr. Stan Kwasny of the Department of Computer Science, who taught the information systems design and development courses in which SOLOS was developed as a group project, also provided valuable advice and encouragement. We also wish to acknowledge the indispensable contributions of Lan-Feng Chen, Judith Grabiner, and Mei-Chen Lu, who collaborated with the authors in designing and implementing SOLOS.

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The Compact Disc: Library Application of an Audio Revolution

Bruce Connolly

An audio revolution is scheduled for mid-1983. With the American commercial debut of the digitally encoded, laser-read compact disc recording, audio engineers are ushering in the all-digital era of sound reproduction. The general consensus among audio technical writers and critics is that the compact disc (CD) could represent the most significant and fundamental advance in the field since Thomas Edison first demonstrated that he could guide a stylus along the indentations pressed into a sheet of tinfoil and make the phonograph mimic the waveforms of its inventor's voice. Early commercial success in Japan, where the CD was introduced last year and where demand far outstrips supply, is the best evidence yet that such an assessment might not be all hype.

The immediate benefit the CD offers over the LP or cassette tape is improved sound quality—greater dynamic range, sharper channel separation, lower distortion, and the elimination of surface noise—and higher fidelity, or faithfulness, to the original source material. For library applications, though, the CD's real attractiveness lies more in the disc's physical attributes. Many of the toughest problems that have faced library collections of sound recordings find their solutions in this new technology.

TECHNICAL DISCUSSION OF THE COMPACT DISC

To appreciate the CD it is necessary to outline the disc's unique technology and operation and to compare it to the disc systems now available: the conventional LP and the so-called digital disc, which has found particular favor among audiophiles.

The LP originates with a master tape recording, an analog process which captures

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a physical likeness of the waveforms that the original sounds produce. During the pressing process, a representation of these waveforms is etched into the walls of a continuous microgroove on the disc's polyvinyl chloride surface. Playback is by means of a stylus moving along that groove and tracing the modulations imprinted there, another analog process.

The digital disc is a somewhat misnamed hybrid. It is the product of a digital recording process in which a virtually perfect model of the original source material is reconstructed by means of a computerized encoding system called pulse-code modulation (PCM). In an analog recording, the aim is to *capture* every detail of the incoming signal's waveform. In digital recording the voltage of the signal is *measured* 44,000 times every second and each of those samples is then *assigned* one of a possible 65,000 values, expressed in binary notation. These measured values are stored and used to recreate an approximation of the original source's waveform. While in actuality this approximation has a "jagged" edge as a result of dividing a continuous process into discrete units, by measuring frequently enough and by making very fine gradations between assigned values, it is possible to collect enough data to enable the system to smooth these rough edges and create a replica that is audibly indistinguishable from the original when all the measurements are converted back into music.[1]

Manufacturing standards for the hybrid discs are much stricter than for the LP: the mastering process proceeds with great care at a slower speed, and the superior-grade virgin vinyl used to press the discs results in higher fidelity and less surface noise. Digital disc playback, however, remains a mechanical, analog process, once again a stylus moving along a groove.

The compact disc, in its purest and most advanced form, is digitally encoded at the source of its recording and digitally played back using a laser beam. The term *compact disc* or *CD* refers more generally, however, to the playback medium, because at this point there are very few recording studios with digital capability; thus many of the initial CD releases have originated as analog masters. Several other descriptors are also used, including the Digital Audio Disc (DAD) and the Audio High Density disc (AHD), but the simple term *compact disc* is used most frequently and consistently among audio writers.

Physically a CD is a shiny aluminum disc about $4^{3}/_{4}$" in diameter sandwiched between two protective layers of plastic for a total thickness of about $^{1}/_{16}$". It comes packaged in a $5^{7}/_{16}$" × $4^{7}/_{8}$" × $^{3}/_{8}$" plastic case similar to that used for cassettes. Currently only one side is playable and, it can hold over an hour of music.

Impressed on the disc's aluminized signal surface below the plastic coating is a spiral track of carefully spaced microscopic pits of varying lengths. Encoded in this track of pits is the quantized binary information stream that the digital recording process produces.

Playback is by means of a specialized CD player in which a low-power diode laser performs the same function as the stylus of a conventional LP record player. The laser beam is focused through the plastic surface of the disc onto the underside of the microscopic pit sequence in the disc's signal surface, and reflected from the disc onto a light-sensitive photodiode. (Focusing from below causes the pits to be read as bumps.) When the laser beam meets one of these inverted pits on the rotating disc, it is scattered and read as a dark flash of a specific length by the photodiode. The absence of a pit is read as a light flash. The player's electronic circuitry converts this information stream into binary code and ultimately into varying audio output signal voltages, i.e., stereo sound.[2]

MERITS AND LIBRARY APPLICATIONS

Amidst all this technology, it is possible to lose sight of the main rationale for digital playback: improved sound quality. Digital sound does have its detractors who insist that the whole process produces a harsh, sterile sound, and that they can detect the jagged edges in the reconstructed waveform despite the high frequency of sampling and the infinitesimal units of measurement.[3] But in an LP/CD comparison session held by *High Fidelity* with its classical critics, a group with considerable experience listening to top-quality equipment

and very high standards, Allan Kozinn reported that "the tests saw a certain amount of cynicism about digital sound disappear as the critics were confronted with the CD's seemingly limitless ability to accurately reproduce pure orchestral sound in all ranges."[4] In general, the first CD and CD player reviews have described their sound as the best available outside the recording studio.

Approval of the CD's physical characteristics appears unanimous. First, the convenient size makes it much easier to handle than the unwieldly 12-inch LP. More importantly, surface noise has been eliminated. There are no pops, clicks, hisses, echoes, nor background roar. There is no warpage to cause distortion. And skips and other defects are controlled in several ways: first, by encoding redundant back-up information into the CD's surface; second, by means of the player's error-correction system, which compensates for minor damage to the disc; and third, by what is called error-concealment, a computerized process integral to the players, that interpolates estimated values for ones that are lost when a disc has been significantly damaged.[5] Moreover, the CD format has been standardized internationally, which means that any compact disc will work on all CD players.

What makes the CD useful for library applications is its durability and its resistance to wear. CDs are virtually indestructible, as this test by the same group of *High Fidelity* critics clearly demonstrates:

> Since nonaudiophiles are sometimes careless with their LPs—leaving them out of their sleeves to collect dust and cat hairs, or handling them carelessly, with fingers on the grooves—we thought some sort of endurance test should be performed . . . By critical consensus, we targeted *The Planets* for demolition and subjected it to treatment that would have destroyed an LP. First we smudged fingerprints all over it. It played perfectly. Then, testing it between each attempt, we wrote on it with pencil and with pencil eraser; we scratched it with a key; we even smeared powdered coffee creamer on it, all to no avail. Bending or melting it would probably have done the trick, but we had to concede that under normal—well, even under severe-bordering-on-hostile—conditions, the CD is indeed indestructible.[6]

Photo Courtesy of Sony

In a setting such as a library, where it is difficult if not impossible to constantly monitor the handling each record receives, the benefits are obvious. Equally important in the long run is the fact that, because there is never any contact between the playing surface and anything other than a beam of light, the concept of wear hardly applies.

Wear is a deadly enemy of the LP. Jerry McWilliams, in *The Preservation and Restoration of Sound Recordings*, recommends taping records after ten plays and then retiring them.[7] Further, it has been found that vinyl loses its elasticity and becomes very brittle for about sixteen hours after being played. A second playing during that recovery period shortens the LP's life by some fifty plays.[8] By contrast, the CD is perfectly suited for library applications such as reserve room use, where play may be repeated and frequent, or for use by a patron who may wish to learn a particular piece or passage of music by hearing it over and over.

In many ways the CD player complements the features of the disc. It too, is very durable, as one reviewer's understated evaluation demonstrates: "The mechanisms seem to be stable enough; fairly violent shaking of the players while they were playing caused *no* audible trouble."[9] Specific features vary from player to player, but most will perform functions such as forward and backward scan and search for specific selections, pause, and automatic repeat of whole sides, specific cuts, and in some cases, specific passages within cuts.

Most are programmable, allowing the listener to select playing sequence. Many have headphone outputs, a plus for library applications; very precise cuing, which allows a listener to interrupt play and then restart it at exactly the same point; and some kind of real playing time display. Operation is very convenient, essentially similar to a tape or videocassette.

Some writers are already speculating about potential extra-audio features that might be incorporated into the unused channels on the CD's signal surface, which has the storage capacity of several thousand floppy discs.[10] One writer suggests text, possibly liner notes, credits, librettos, or lyrics, and other graphic or verbal information;[11] another, computer programs and video games.[12]

For libraries, the administrative advantages are also very important. Few libraries have the time or personnel, for example, to audition every disc they receive. However, poor-quality vinyl and careless factory production methods account for a minimum defective rate of 5 to 10 percent, and very critical listeners may rate up to 75 percent of the pressings unacceptable.[13] Defective LPs may be processed into the collection and go undetected for an indefinite period. CD technology eliminates at least some of the minor defects common to LPs—mainly those associated with surface noise—and "from a practical point of view, the ability to correct errors means that the requirements for disc manufacture are not pushed to impossible limits."[14] Also, from an administrative standpoint, the low maintenance CDs require is certainly a plus, as is their durability, since the monitoring of their use and condition can be much less rigorous.

Finally, the CD's compact size—in its case it takes up about 10 cubic inches compared to about 18 cubic inches for an LP in its jacket—can help alleviate one problem that all libraries ultimately encounter: space. Less subject to warpage and the adverse effects of humidity or fluctuations in temperature than the LP, as David Ranada proved by "baking" a disc for three hours and then totally immersing it in hot water,[15] CD storage requirements are also less stringent than those for LPs.

DRAWBACKS

The chief drawbacks associated with the CD stem from its novelty in the marketplace and should therefore become less and less important if and when the CD achieves commercial viability. Whereas LPs typically list for eight or nine dollars, CDs, which are imported from Europe and Japan, may cost as much as fourteen to twenty-two dollars, at least initially. And because they are incompatible with conventional turntables and record changers, CDs require the purchase of their own playback system, which is now priced in the neighborhood of eight hundred to eleven hundred dollars. The price for basic units will almost certainly fall, possibly to the two- to three-hundred-dollar range,[16] as more of the units become available and competition intensifies among the nine companies licensed to manufacture CD players.

At present a critical element in the success of the CD is their *extremely* limited availability, both in quantity and selection. U.S. production does not begin until 1984, and even the number of studios where original digital recordings can be produced is very small, particularly for popular music. The few hundred inaugural CD releases are about half classical, half pop.

If the CD does catch on, these problems will fade and the longer-range negative focus will shift to coping with the LP's obsolescence.

CONCLUSION

In terms of sound reproduction, libraries are sometimes satisfied with offering only a suggestion of what a composer or recording artist intended to convey. The experience of listening to music, however, is simply not the same as that of absorbing the printed word. There is, for example, no information degradation with a poor-quality photocopy, so long as it remains legible. But music is more subtle, even to the point where critics argue the *necessity* of reproducing frequencies beyond the human auditory range. Musical information truly is lost when a listener must use poor quality or poorly maintained equipment to play worn or possibly defective recordings.

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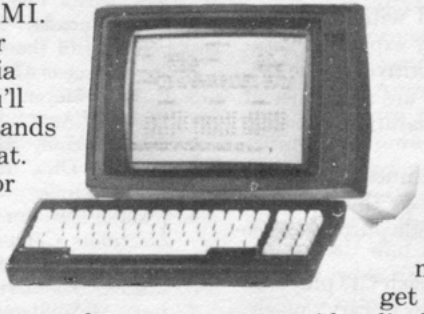

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The most revolutionary and elegant corrective yet to become available is the digital compact disc. Consider the CD in this light—as an audio fine edition with the important added benefits of being durable, virtually indestructible, and nearly maintenance free—and the current steep price for disc and player becomes easier to justify. Moreover, introducing the CD into the library setting would inherently satisfy what McWilliams' considers the purpose of preservation activities: preservation of the physical object and preservation of its sonic content.[17]

RECOMMENDATIONS

Wait a while. At current price and availability levels, it would be premature to rush into CD implementation even in libraries where that is feasible. The LP will not disappear overnight, and it probably will be manufactured for many more years. Eventually, though, the superior CD medium and technology, coupled with improved prices and an enormously expanded catalog, may prove too competitive for the LP.

In the meantime there are a number of long- and short-term preparations libraries may consider making:

1. Assemble the CD technical literature and equipment reviews that may be needed to justify or guide purchases (see Further Reading).
2. Assess the features of each CD player in terms of your particular library's needs. If published equipment reviews can be trusted, price and features will be the two most distinguishing characteristics of the players.
3. Contact record vendors or record companies—PolyGram (including Archiv, Deutsche Grammophon, Oisseau-Lyre, Philips, London/Decca International, Phonogram International, Polydor International), the CBS/Sony group (Columbia, Epic, etc.), Denon, RCA, and WEA (the Warner Bros., Electra/Asylum, and Atlantic), and audiophile labels such as RealTime, Telarc, Nautilus, and Vanguard which have all begun or announced CD production—for information on new CD releases and prices. Collection development planners may wish to take forthcoming CD releases into account when considering LP acquisitions.
4. Consider deferring new turntable or record-changer purchases in favor of, say, headphones or cassette equipment.
5. Visit audio fairs or retail outlets to audition the CDs and players.
6. Begin planning for CD storage, security, budgeting, collection development, circulation and use policies, etc.

In terms of library applications, the digital compact disc's sound quality is almost a secondary benefit compared to its other merits. Inherent in this promising new technology is the potential solution to a number of the practical problems that have historically nagged library phonograph record collections.

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FURTHER READING

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The Book Club: Final Report

Pat Groseck

"The Book Club," a cable television program which brought the library book-talk concept into the homes of hundreds of Central Ohioans through the technology of participatory television, was canceled in November 1982, partly as a result of the development of more advanced technology in the field of cable TV—the cable network.

Initially called "The Home Book Club," the monthly program was a joint project of OCLC, Inc., and Warner Amex Cable Communications, Inc., QUBE/Columbus, with participation by the Public Library of Columbus and Franklin County (PLCFC). The program had its premiere on July 19, 1979, and was to run as a six-month experiment as part of an effort which might eventually pave the way for the development of library information services brought into the home through CATV systems.

Warner Amex agreed to continue the program with the PLCFC following the six-month period as a locally produced CATV program and later as a community public access program. Declining ratings coupled with the company's redirection of their staff and resources to developing a QUBE cable network resulted in the decision to cancel the program after its final show in October 1982.

"The Home Book Club" was designed to act as an extension of the "book talk" often held in library meeting rooms, living rooms, or church basements. With the introduction of QUBE, Warner Amex's two-way interactive cable system in Columbus, home viewers could participate for the first time in a discussion cablecast on their home TV sets via QUBE's two-way home console. The QUBE home console is the channel selection device hooked up to a home TV set. What makes QUBE's console unique is that it contains buttons upon which viewers can register responses to

Pat Groseck is communications director for the Public Library of Columbus and Franklin County Ohio.

The QUBE console is more than just a 33-channel selection device; it additionally allows home viewers to respond to questions on their television screens. Responses are simultaneously gathered and tallied on computers at the QUBE studios.

questions directed at them on their television sets. The responses can be gathered simultaneously and tallied by computers at the local Warner studio.

The program had a host and up to six guests. All books discussed were best-selling paperbacks. The first book was preselected by the Warner Amex producers based on recommendations from PLCFC librarians who provided ten titles of books currently in demand by the public at library circulation desks.

On following shows, the home audience would select the title to be discussed on the next program from a list of five titles, which would appear on their home TV screen, simply by voting on their preference by using their QUBE home console.

Home viewers were able to dictate to the host and guests where the discussion was to lead by touching the response buttons on their console to indicate such directions as:

- Move on, I'm bored.
- I'm interested, keep going.
- Let's take a vote.

Through the technology of QUBE, viewers were able to order copies of the next month's book or unselected titles through the library's Books-by-Mail program. QUBE computers enabled viewers to order books on their home consoles. The host would inform them that their names and addresses would be taken by the computer when they pressed their response buttons. The computer would then print out labels which were given to the library to send paperback books to QUBE subscribers for the next show. Voting on topics to be discussed or books to be selected for discussion was done anonymously on the QUBE computers.

The format of the program involved a brief introduction of guests, a short synopsis of the plot of the book, and guided discussion. Viewers were urged to have Book Club parties in their homes and participate in the program as a group.

QUBE agreed to promote the program on other community programming cablecasts and on-air listings and through special promotional announcements in a monthly program guide sent by QUBE to subscribers.

The library designed, printed, and mailed notices to various groups, sent out news releases, and worked with radio-TV reporters for local newspapers to promote the program. Announcements of the QUBE "Home Book Club" selection of the month were displayed with books in all library locations.

In an article by W. Theodore Bolton, of OCLC in June 1981,[1] results from the QUBE computer indicated that the first two programs were viewed by approximately 175 households or an estimated 420 individuals. Audience size dropped to 375 viewers and 210 for programs three and four and dropped further for programs five and six.

The PLCFC's Books-by-Mail program sent out 760 books as a result of the program and signed up 26 new library cardholders in the six-month initial period.

In 1980, Warner Amex officials indicated to the library that they would like to continue the program. They assigned a staff person to host the program, eliminating a part-time guest host, and worked closely with the library in the selection of book titles and guests. Shows were lively and, though no viewer statistics were released by Warner, the PLCFC Book-by-Mail statistics were running as high as 228 book orders per program. Guests were being selected who had some connection with

Pat Groseck, communications director, and Jeffrey Briggs, video producer for the PLCFC, shoot visuals for 30-second promotional spots and 60-second synopses of books discussed on the program.

the plot of the book or topics being discussed on the program. For example, on the January 1980 program, the home audience selected *Overload* as the book of the month. *Overload* is a fictional account of a severe power shortage and the dealings of a major utility conglomerate. Guests recruited included the chairman of the Public Utilities Commission of Ohio and the Ohio Consumers Counsel, both utility experts, who related their personal experiences with those in the book.

In 1981, the Warner staff person who served as host was promoted and left "The Book Club." Two different hosts served during that year on the show and, Warner preempted the program three times in an eight-month period for special programming. The show took on theme-related topics; one program was dedicated to science fiction, and another to mysteries. Guest selection later centered around persons who were knowledgeable about literature.

PLCFC statistics dropped to 72 books ordered per show in July of 1981.

Columbus, unlike many communities, is served by four cable television companies, each with subscribers in a designated district of the area. Through the efforts of a local organization called the Columbus Community Cable Access, Inc. (3CA), public access programming was being promoted and a method to interconnect the public access channels of these four cable companies was devised.

The PLCFC and Warner worked with the 3CA to schedule "The Book Club" on public access interconnect so that the programs could be cablecast live to all areas of the city simultaneously thus expanding the audience of "The Book Club."

Both Warner and the PLCFC hoped that a revitalized promotional effort, a revamping of the format, and the interconnect capability would boost ratings of the program.

In October 1981, the program was cablecast for the first time on the interconnect system. Viewers ordered 93 books during the program.

In February 1982, Warner turned the program over to the PLCFC in regard to payment and selection of host, guests, books, script writing, synopses, visuals, and promotion. A Warner staff member worked with the library as a volunteer on the program and a local university professor acted as volunteer floor director and assisted with script development. The program became a true public access cable program.

Despite efforts by the library staff to recruit interesting and well-known local guests (the library could not hire a professional host for the program), lure outspoken guests to appear on the program, and select book titles with themes that could generate lively and controversial discussion, the book order statistics dropped during 1982 to such figures as 37, 3, and 20 orders per month.

Programs included a discussion of *Black Macho and the Myth of the Super-Woman* during Black History Month, with a black Columbus city councilman serving as host and former civil rights activists as guests, and a discussion on *How to Play the Game* with a comparison of sports and politics by four politicians who were former athletes.

A rally back to 73 book orders in September gave the library encouragement that with regularity and promotion, "The Book Club" could generate a good audience level.

Warner Amex began initiating plans to realize the company's cable television network—a network of programming to be cablecast in all cities wired by the company. The plan meant a redirection of programming efforts.

On the February 1982 "Book Club," Charles Brown, assistant executive director of the PLCFC; Eleanor Alger of the ACLU; Barbara Blake, a Columbus educator; and host Jerry Hammond, a Columbus City Council member, discussed the civil rights/black power movement as portrayed in Black Macho and the Myth of the Superwoman *by Michelle Wallace.*

This, coupled with the information that QUBE computers were reporting dwindling audiences, led to the decision to cancel the program.

Any production effort involves a great deal of staff time to make a program attractive and interesting to attempt to keep viewers tuning in to a program.

While the PLCFC allocated no actual dollar figure in its budget for the production of "The Book Club," the library provided an in-kind investment of more than 60 hours of staff time per show for production and 17 hours per show for processing book orders. The PLCFC is fortunate to have a Communications Department staff which has expertise in videotape production, journalism, script writing, graphics, and community relations. Approximately 40 hours per month were spent by the communications director recruiting guests, writing scripts, synopses, news releases, and memos, gathering visuals, attending production meetings, and acting as floor producer for the show. The library's video producer spent approximately 10 hours per month on producing a 30-second promotional tape and shooting the visuals for the program. The communications assistant and librarians in the Fine Arts, Humanities, and Recreation Division of the Main Library contributed about a total of 10 hours a month in research and staffing the phone lines at the studio during the program.

The Books-by-Mail and Fiction staff invested at least 17 hours a month. The staff there recommended book titles and wrote brief plot synopses of book choices, ordered books, and processed "Book Club" book orders, attended coordination meetings, and carried out other assignments.

Warner, in their efforts to produce a professional looking program, invested the time of all production and technical staff for the program as well as the use of their well-equipped studio.

Warner Amex staff and library staff continue to work together on various projects and hope to produce various joint projects in the future. Suggestions that have been raised for future programming include town meeting–style programs with the library surveying the needs and desires of the community in future library planning utilizing the QUBE participatory home console, and the possibility that someday an adaptation of "The Book Club" might be done on a QUBE network level.

REFERENCE

1. W. Theodore Bolton, "A Lesson in Interactive Television Programming: The Home Book Club on QUBE," *Journal of Library Information* 14:103–8 (June 1981). ■■

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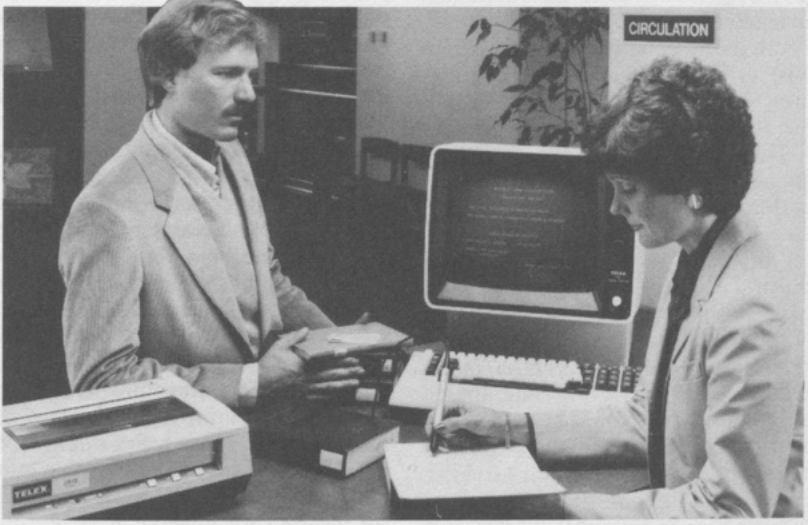

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Surveying Users of Automated Turnkey Systems

Philip Schwarz

INTRODUCTION

The process of selecting an automated system is a long and complex one. It will involve activities such as conducting a needs analysis, writing a request for information, writing a request for proposal, and evaluating the responses to the request for proposal. During each of these activities, it may be necessary to contact other libraries with automated systems to gather information required in the library's decision-making process. Most librarians have not had the opportunity to purchase computer systems before. The process can be significantly different from that associated with other purchasing decisions. This paper has been developed in an effort to assist librarians in asking the right questions when surveying the users of automated systems.

The process of conducting user surveys is similar to that of interviewing references of a prospective employee. All information gathered during user surveys should be kept in strict confidence. In spite of this caveat, the interviewer should be aware that references are sometimes less than candid. This is certainly understandable given the importance of the decision that they have made and the prestige riding on their decision. Librarians are sometimes reluctant to mention problems. Even when mentioned it is sometimes difficult to establish whether or not the problems encountered are the fault of the vendor or whether they were really a result of poor planning on the part of the library. Also keep in mind that once a library has signed with a vendor, staff may feel a need to defend the decision even though they may have made a major mistake. The library staff, after all, must continue to work with the vendor and may not want word to filter back to the vendor that they are unhappy.

The process of conducting vendor surveys should be structured and consistent. The interviewer, however, should be alert and ready to pursue a point if an interesting line of questioning develops. The interviewer will likely discover additional information of value in this fashion. Know what you are going to ask so you don't forget important questions. The survey form that follows is designed to allow the interviewer to cover the major issues involved in the selection and implementation of an automated system.

There are a number of approaches that libraries may use to conduct interviews. Some divide the user libraries up between several individuals and ask each to conduct the entire interview. It is important when using this approach that each interviewer is using the same interview form when interviewing users of the same vendor. This will help assure that comparable information is being gathered. Some libraries may wish to divide the interviewing up by type of person being interviewed. For example, the library director may be responsible for interviewing the director of the user library and the project director may be responsible for interviewing the project director of the user library. Another approach is to divide the questions into "library" questions and "computing" questions with the librarians interviewing librarians and someone with a technical background interviewing someone with a similar background at the user library. The library should select an approach that fits their needs and the personnel available.

Expect to spend a considerable amount of time on the telephone with users. As a courtesy, the interviewer may want to call the interviewee and set up a time for the interview that would be convenient for both parties. Keep in mind some of the interviews may last several hours. If time permits, the interviewee should be provided with a list of questions prior to the interview so some thought can be given to the answers. Few library staffs have the information required by the interviewer at their fingertips.

It always helps if the interviewer can develop a good rapport with the person being

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interviewed. Frequently this will occur after the conversation has gone on for some time. Usually, the better the rapport, the better the information. If someone from the library's staff knows the person being interviewed, it may help if they do the interviewing.

Expect to document the conversation in writing and in considerable detail. Don't rely on sketchy notes and memory. It is important to remember that very complex information will be involved. If at all possible, the interview schedule should be set up so the interviewee can rate the vendor's performance on each section of the schedule on a scale of say 1 to 10. This will make it easier to tally the composite results of all of the interviews. It will also provide an indication of whether or not the interviewee is a high or a low scorer.

The interviewer should tailor the interview to meet the needs of his library and the applications that are expected to be installed in his library. The vendor, as a part of his response to the request for proposal, should be required to provide the library with a list of customers. The list should be fairly comprehensive and based upon specifications provided by the library. The list of users should include the name and address of the organization; the name, title, and telephone number of a responsible individual in the organization who may be contacted; the installed configuration and type of work being accomplished; the current file size in titles, items, patrons, and indexes; the current online circulation load; and the date of installation. Libraries should be aware that information provided by the vendor is frequently inaccurate and dated. Generally a library will want to contact those customers that are a similar type or size. There are, however, instances in which other factors may enter into consideration. If the library expects to use the circulation and the online catalog functions, libraries using these functions should be contacted. Libraries considering the formation of a network should also contact networks. Systems may operate well for a single library but may operate less well when used by a network. Special communication problems or service considerations may also enter into the decision.

Feel free to prepare specific questions for each vendor. Frequently the library will have concerns about how a vendor performs a certain function or how a piece of equipment offered by only one vendor may be functioning.

On-site visits are preferable to telephone interviews. While it is likely that a large number of on-site interviews will normally not be possible, at least one or two should be made to user sites of those vendors under final consideration. The vendor should not be present during the site visits as this might inhibit the free flow of information. The on-site visit provides an opportunity to garner a wider range of opinions than normally acquired through a telephone interview. If an online public catalog is being considered, it will also offer an opportunity to observe and talk with patrons. In addition, the interviewer is more likely to get a better picture of how the system operates and a feel for the practical considerations that are likely to cause problems. Frequently the interviewees have lived with some problems for so long that they fail to mention them in a telephone interview, but they cannot escape notice during a demonstration on the system.

It is important to note that the survey form on the pages that follow is designed to be used in connection with an automated circulation system. While most of it is valid for use in selecting any automated turnkey system additional application, specific questions may be required if it will be used in connection with other applications.

INTRODUCTION TO SURVEY QUESTIONS

The vendor should have provided the library with a list of customers along with the names of contact persons and appropriate telephone numbers. Keep in mind that it may be necessary to call more than one person at each institution. One person may be able to give you a general overview of the administrative decisions made while another person may have to answer your technical questions.

Profile of the User Library

The interviewer may be able to secure some of this information from the vendor's proposal or standard library directories. It

should, however, be double-checked with the interviewee.

System Profile

It is important to note the distinction between this information and that collected under "profile of the user library." This section will tell you what is actually happening on the system. The library may circulate one million items in any given year but it may be circulating only half of them on the system.

Hardware Profile

This information may be difficult to secure. The interviewer may be surprised at the number of librarians who don't have it readily available. This type of information is best gathered by someone with a technical background.

Software Profile

It is important to know which functions are currently being used as well as the release number. The interviewer may receive very different answers to identical questions from librarians using the same system but different releases. Responses to these questions may be difficult for the interviewer to understand because of a lack of familiarity with the vendor's system. It is important to have worked with the system prior to and after the interviewing process. Information for this section can best be completed with a site visit.

Interactive Workload

This information is usually very difficult to secure. Very few libraries keep the detailed records necessary to obtain it.

Service

Keep in mind that statistics can be misleading. The same percentage of up-time may be recorded if the system is down a few hours at a time on a frequent basis as would be reported if the system operated well most of the time but was down for a prolonged period every so often. The implications may be far different for the librarian. Service from a given vendor may vary over a time. The interviewer should attempt to clarify what the recent level of service is.

Staff Support Requirements

This information will help the library determine the labor costs associated with an automated system. The library will find that they are considerable, particularly during the implementation phases of the project.

Educational Support

Keep in mind that educational support provided by a given vendor may vary from time to time. It is best to rely mainly on those libraries with recent experience.

Bibliographic/Item Database

Information in this section should provide the library with ideas regarding the range of options available for building the initial bibliographic files as well as matching the item records with the bibliographic records.

Patron Database

Information in this section should provide the library with a good idea of the options in creating patron databases. It should also identify any potential problems the library may encounter.

Vendor Support

This section should give the library an idea of the working relationship it will have with the vendor.

Summary

Use this section to gain an overall view of the system from the user's point of view.

OUTLINE OF SURVEY QUESTIONS

I. Introduction
   - A. Vendor name
   - B. User library
   - C. Contact person
     1. Name
     2. Position
     3. Phone number
   - D. Name of person making call
   - E. Date of call

II. Profile of the user library
   - A. Type of library
   - B. Annual circulation
   - C. Collection size

1. Volumes
2. Titles
3. Titles added annually
4. Titles withdrawn annually

D. Number of branches

III. Description of the automation process
- A. Why did you decide to automate?
- B. How did you justify automation?
- C. What type of selection process did you use?
- D. Why did you choose the vendor you did?
- E. Has the system met your expectations?
- F. What specific benefits has the system achieved?
- G. Have there been any cost savings?

IV. System profile
- A. When was the system installed?
- B. When did the system become operational?
- C. Number of circulations being performed on the system
- D. Size of the bibliographic file
- E. Size of the patron file
- F. Number of branches on the system

V. Hardware profile
- A. Description
  1. Number, brand, model, and memory of the cpu
  2. Number, model, and capacity of the disk drive(s)
  3. Number and model of the tape drive(s)
  4. Number and model of the system printer(s)
  5. Number and model of other printer(s)
  6. Number and model of terminals
  7. Number, model, and speed of the communication devices
  8. Number and model of other equipment connected to the system
- B. What was the overall cost of the system hardware?
  1. Computer site
  2. Terminals
  3. Communications
- C. Did the system proposed by the vendor meet your initial needs?
  1. If not, why not?
  2. What equipment had to be added or upgraded (describe)?
  3. What were the costs for the upgrade?
  4. Who bore the costs for additional equipment?
- D. Has the system proposed by the vendor continued to meet your needs?
  1. If not, why not?
  2. What equipment had to be added or upgraded (describe)?
  3. When was the additional equipment added?
  4. What were the costs for the upgrade?
  5. Who bore the costs for additional equipment?
- E. Did you contract for hardware that has yet to be delivered?
  1. What is the problem?
  2. What is the length of the delay?
  3. Have you taken any legal action or invoked any penalties?

VI. System environment
- A. What type of environment is the system housed in?
- B. Were the vendors site specifications adequate?
- C. What, if anything, would you do differently?

VII. Software profile
- A. What software functions are you using?
- B. What release number are you using?
- C. What functions and/or features do you like best?
- D. What functions and/or features do you like least?
- E. What functions and/or features would you like added to the system?
- F. Is the system designed to be flexible so it can adjust to the needs of the individual library or does the

library have to adjust to the system?

G. Did you contract for functions or features that have yet to be delivered?
   1. If yes, what is the problem?
   2. What is the length of the delay?
   3. Have you taken any legal action or invoked any penalties?

H. Has the vendor corrected software errors promptly?
   1. How long did minor corrections take?
   2. How long did major corrections take?

I. Has the vendor failed to deliver any functions or features that you understood would be available?
   1. Which features were those?
   2. What are the reasons for the delay?

J. Has the vendor continued to enhance the system?
   1. Has the vendor met the schedule for new releases?
   2. If not, describe the delays and the reasons for them
   3. Are new releases well tested prior to their being placed in general release?

VIII. Interactive workload
   A. What is the transaction load on the system by function?
   B. What is your peak and average response time by type of transaction/inquiry?
   C. Is your response time equal to or better than the vendor said it would be?

IX. Service (maintenance)
   A. What is the system downtime (system is unavailable for library use) as a percent of scheduled up time?
      1. What percent of downtime is scheduled?
      2. What percent of downtime is unscheduled?
      3. How do you record system performance?
   B. What level of service did you contract for?
      1. Has the vendor provided this level of service?
      2. How does the vendor provide service at times other than 8 to 5 Monday to Friday?
   C. What is the service response time for a system failure from the time of the service call until the service person is on-site
      1. On the average?
      2. In the worst cases?
   D. Once on-site how long does it take to fix the problem?
      1. On the average?
      2. Worst case?
   E. What is the longest time the system has been down?
   F. What pieces of equipment are down the most?
   G. What software problems are the most troublesome?
   H. What preventive maintenance schedule is provided by the vendor?
      1. Is it followed?
   I. How far is your library from a service center?
   J. Does the vendor provide service over the telephone?
      1. What level of service can be expected?
      2. What is the average response time for service over the telephone?

X. Educational support
   A. What level of training did you contract for?
      1. Did the vendor provide this level?
      2. Did you feel it was adequate?
   B. What is the quality of the documentation and training manuals?
   C. Was the level of vendor support adequate to ensure a smooth transition to the new system?
   D. Has the vendor continued to provide training as new software and hardware are added to the system?

XI. Staff support requirements
   A. What level and number of staff were/are assigned to
      1. Conversion?
      2. Project coordination?

3. System operation?
4. Training?
5. Was the level and number of staff assigned to the project adequate?

B. What impact has the system had on staffing patterns?

XII. Bibliographic/item database

A. What conversion method did you use?
1. How many records could you create per hour?

B. What level of bibliographic record did you create?
1. Full MARC?
2. Partial?

C. How did you match the item with the bibliographic record?
1. How many item records could you match per hour?

D. What functions on the system cause slow response time?

E. What percent of the collection was converted by the time you started circulating?
1. If less than 100 percent, was this adequate?

F. How are you creating bibliographic/item records for material currently being added to the database?

G. What, if any, problems did you have with the bibliographic database?

H. What, if any, major problems are you having with database management?

I. What would you do differently?

XIII. Patron database

A. How did you create your patron database?
1. How many records could you create per hour?

B. What percentage of the patron database was converted by the time you started circulating?
1. If less than 100 percent, was this adequate?

C. How are you creating your records for patrons currently being added to the database?

D. What if any major problems are you having with database management?

E. What would you do differently?

XIV. Vendor support

A. Did the vendor tell you all that you needed to know before you committed yourself to the project?

B. How long did it take to install the system after the vendor was selected?

C. Was the system delivered on schedule?
1. If not, why not?

D. Was the vendor honest in his presentation or did he gloss over some of the major problems?

XVI. Summary

A. What were your biggest problems?

B. What would you have done differently?

C. Would you select the same vendor again?

D. What is your overall satisfaction with the system? ■■

Online Manuscript Search Service

Robert N. Bland and James B. Lloyd

The Special Collections Department of Hunter Library, Western Carolina University, houses University Archives, rare books, and approximately six hundred linear feet of regional manuscript material in 165 separate collections. The finding aids to these collections reflect recent changes in archival theory in that we have autograph files (alphabetical lists of correspondents and individuals referred to) for the older collections contained in a card catalog and unindexed inventories (general descriptions of the collections and folder by folder listings of their contents) for the newer ones.

Robert N. Bland is head, Catalog Department, and coordinator of Computer Applications and James B. Lloyd is curator of Special Collections, Hunter Library, Western Carolina University, North Carolina.

We felt the need to index the newer collections for both name and subject access, but we also felt that to do so without integrating the proposed index with the existing autograph files for the older collections, which were also unintegrated and for which no subject access existed, would be counterproductive. The most efficient way to integrate the index seemed to be through an online system rather than a unified card catalog, since an online system would give us considerably more flexibility once the data were input. We likewise decided that since we were automating the finding aids we should automate bibliographic control as well to create a unified online system for manuscripts.

ITEM VS. GROUP DESCRIPTION OF MANUSCRIPTS

It seemed obvious that a system based faithfully upon current MARC cataloging formats, including the LC MARC format for manuscript, which is based on monograph description, would not be adequate for our purposes because manuscript collections differ from published materials in several basic ways. In the first place, while published materials certainly differ in length, they do not differ in size as manuscript collections do. Ours, for instance, range from a collection consisting of a single one-page letter to a modern political collection of seventy-five linear feet, or twenty-five standard three-foot library shelves. Item description, while adequate for the single letter, is certainly not adequate for a collection of such magnitude, which may contain perhaps five hundred thousand separate items.

The problem of the size of manuscript collections is compounded by their even more distressing lack of unity. Published material, in no matter what form, possesses some sort of organizing principle that allows one to classify it within the general framework of knowledge and to assign to it a limited number of subject accesses. But manuscript collections are heterogeneous; they do not have the unity that makes item classification and description possible. A folder of correspondence, for instance, may contain letters from any number of individuals that bear on any number of subjects, if, indeed, one can say that some bear on any single subject whatsoever. And in a large political collection, one may find fifteen feet of general correspondence on countless subjects, thirty-five feet of committee reports and background material from four different committees, twenty feet of case files, and fifteen feet of miscellaneous material at the end.

Item-based systems of description lack the flexibility to handle such an accumulation, which is the reason archivists have, where possible, abandoned the card catalog for the inventory for purposes of bibliographic control. This inventory, which was developed by the staff of the National Archives to facilitate group description—as opposed to the item description in a library catalog—consists of information concerning provenance, size, form, physical condition, inclusive dates, terms, restrictions on the use of the collections, and a scope and content note, which may be from one paragraph to several pages long and which describes the collection in a general way and may list pertinent subjects and individuals found in it, followed by a folder-by-folder inventory. Such a finding aid is flexible enough to be useful for collections of any size since one may continue to describe groups within groups with what are called series notes—smaller scope and content notes—until an adequate level of description is reached, and so is more suitable for manuscripts than item-oriented MARC-based systems.

THE ONLINE MANUSCRIPT SEARCH SERVICE

We thus set out to create an inventory-based system that would do the following: be compatible with existing MARC-based systems to ensure that ours would interface on a national level; be useful for bibliographic control as well as for reference; substitute some form of scope and content note for the traditional catalog card; facilitate a unified name index file to be keyed to the folder level (we judged that anything less would not adequately serve the research interests of users); and facilitate a subject file also to be keyed to the folder level.

We might have tried to buy an existing package to adapt to our needs, but we decided that given the resources at hand we could develop our own system with approximately as much effort as we would expend trying to find and adapt an existing one. We considered designing the system to run on some of the available microcomputers, as this would mean we could most easily transfer our entire data files to other locations, but decided against this for two reasons. The microcomputers have limited storage space for our purposes, and our university had just purchased two VAX-11/780s, which assured our access to a mainframe machine in the foreseeable future.

The realization of these efforts we call the Online Manuscripts Search Service (OMSS), a MARC record based online information retrieval system that provides full search and maintenance capabilities for the department's manuscripts records and indexes.

SYSTEM ARCHITECTURE

The system was designed for and is currently implemented on the university's VAX-11/780 computer, running version 3.0 of the VAX/VMS operating system. Software for OMSS is written exclusively in VAX-11 BASIC.

The database is composed of three interrelated files: the Collection Register File, which consists of variable-length records containing the bibliographic and descriptive information for the collections; the Name File, which consists of fixed-length records (80 bytes), containing personal names and pointers to collections where information concerning these names can be found; and the Subject File, which consists of fixed-length records (140 bytes), containing personal and topical subject headings and pointers to collections where information on these subjects can be found. (A national subject database for manuscripts may not be too far away, and we are concerned with the compatibility of our subject file. Because of their chronological arrangement in history, the Library of Congress subject schedules have proved unsatisfactory for manuscripts. Until some agreement is reached on a national thesaurus, we intend to run our subject index on a limited basis using modified LC subject headings.) The number of pointers that can be assigned to Name and Subject records is in principle indefinitely large, although storage space for the pointers is assigned in fixed-length blocks of 60 and 80 bytes, respectively, as the need arises. The data files are designed to be used with global buffers, which facilitate the simultaneous use of data by multiple users.

SEARCHING THE FILES

The search module of the system provides users with access to each of the files through lexically and syntactically simple commands which are entered at the terminal. Specifically, the system permits searching of the Collection Register File by means of the manuscript collection title, the manuscript collection number, and a control number assigned to each record by the system. In addition, free-text searching of Collection Register records is provided through the "title key" command. This feature enables users to search Collection Register records, including the narrative description of collection contents, using single or Boolean combinations of keywords. Occurrence of the keywords in any portion of a record results in a "hit" with notification to the user that information concerning that keyword (or combination of keywords) may be found in the identified manuscript collection. Keywords may consist of entire phrases, words, or word stems.

Searching of the Name and Subject files follows a similar pattern. Names and Subjects may be searched for on an exact match basis using controlled vocabulary terms, or, using the "name key" and "subject key" commands, users may enter keywords which the computer then compares sequentially against each name or subject in the appropriate file, with the system identifying and printing out successful string matches. For example, use of the commands "NAMEKEY" and "BOYD" results in retrieval of the name "VIRGIE, LUCY BOYD" from the name file, even though the search term is a middle name rather than the surname on which the record is indexed. This feature should prove to be of value in genealogical searches. Similarly, use of the search "SUBKEY" followed by "NORTH CAROLINA" as search term will retrieve from one subject index all records

Table 1. Tags and Fields in the Record

Tag	Field Name	Use
001	Control Number	System Supplied Record Control Number
008	Fixed Fields	Fixed Field Information Supplied by the Operator and the System in the MARC Manuscripts Format
041	Languages	Languages of Collections
049	Holdings Location	Indicates the Special Collections Department as the Holdings Location
099	Collection Number	Accession Number of the Collection, e.g., MSS 80-14
245	Collection Title	Title of the Manuscript Collection
260	Dates	Inclusive Dates of the Collection
300	Physical Description	Size of the Collection in Linear Feet
506	Limited Use Note	Restrictions on Use of the Collection
520	Descriptive Note	Describes Contents of the Collection. Repeatable Field.
535	Terms	Special Terms Governing the Collection
541	Donor	Name(s) and Address(es) of Donor(s)
590	Local Note	Special Shelving Locations
949	Physical Formats	Locally Defined Field to Record the Physical Formats of Materials

in which the term "NORTH CAROLINA" appears, whether as primary subject or as a subject subdivision.

In addition to providing both controlled-term and free-text searching of the files, the system also provides users with the capability of examining the indexes online through a browsing function. Upon entry of the commands "SUBJECT" and "BROWSE," for example, OMSS responds with a prompt which asks the user to identify the element of the alphabet where the browse should begin and where it should end. Records found within this interval are then displayed upon the screen, one screen at a time, until the end position is reached. For more sophisticated searching, the user is presently referred to the Online Manuscripts Search Service User's Manual. A fully online Help module is planned for version 2 of the system.

RECORD STRUCTURE AND FILE MAINTENANCE

The input, delete, correct, and update modules required for maintenance of the files are, for obvious reasons, isolated from public users. Access to these modules is controlled by means of a password. Records may be added to the Collection Register File by authorized operators either through keyboard input from a terminal or through loading of records in the manuscripts format from OCLC tapes. Collection Register records input at the keyboard are entered in response to system prompts for tag and field text data. Transparently to the operator, the system checks for illegal tags (a list of legal tags has been predefined for OMSS), automatically supplies a control number for the record, adds standard leader, fixed field, and field indicator data, adds the appropriate delimiters and field terminators, computes a record directory, and writes the record to the Collection Register File on disk, where it is stored in full MARC II Communications format.

The tags and fields chosen for inclusion in the record structure thus far are indicated in table 1. With some minor modifications, use of these tags and fields in OMSS complies with LC MARC specifications for the manuscripts format. It will be noted that the record structure above contains no 6xx or 7xx fields for subject and name headings respectively. This is because the Subject File and the Name File are created and maintained separately but linked to the main Collection Register File. The purpose of this, as intimated above, is to avoid one of the large limitations of the MARC format for describing manuscript collections, viz., the limited kind and number of name and subject headings which can feasibly be attached to bibliographic records for the collections. With manuscript collections, dozens—perhaps hundreds—of name and subject headings may need to be indexed to a single collection. Obviously this is not practicable with a record structure which includes name and subject headings as an integral part of the bibliographic record. The separate Name and Subject files of OMSS, on the other hand, provide means

```
                                    MSS 80-6
                                    9004541

WILLIAM WILLIAMS STRINGFIELD
INCLUSIVE DATES: 1801-1959
COLLECTION SIZE: 5 l. ft.
William Williams Stringfield (1837-1923) was born in Tennessee,
served in the Confederate calvary, and organized a company in the
31st Tennessee Infantry during the Civil War.  He later joined the
69th North Carolina Regiment, the Thomas Legion, for the remainder of
the war.  After the war, Stringfield settled in Haywood County, North
Carolina, and developed business interests.  In 1879 he built the
White Sulpher Springs Hotel in Waynesville.  He served in the State
House of Representatives (1883) and State Senate (1901; 1905).  The
collection contains material on Robert Love, members of the Stringfield
family, Confederate veterans activities, Civil War related items,
and an extensive onotograph collection.

DONOR: Mr. and Mrs. Samuel J. Sloan, Waynesville, NC
TERMS: gift
RESTRICTIONS: none
LOCATION:
CORRESPONDENCE 1832-1949                DIARIES 1837-1901
FINANCIAL RECORDS 1901-1931             LEGAL PAPERS 1801-1911
CLIPPINGS & SCRAPBOOKS 1889-1959        LITERARY PRODUCTIONS & REPORTS
OTHER PRINTED MATERIAL                  ICONOGRAPHIC 1888-1958
GENEALOGY                               OTHER
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Fig. 1. User Screen Display.

for a virtually indefinite expansion of the kind and number of headings assigned to collections. Moreover, since the files are stored as Indexed Sequential Access Method (ISAM) files, maintenance of the files, including global changes, is comparatively easy and efficient, since changes may be made to the headings without complete processing of the bibliographic record.

The Collection Register record in full MARC format, complete with tagging, is visible only to the operator at the time of creation or editing of records. The record displayed to the end user is a result of a screen display module in the search program which formats the data and adds print constants. A typical OMSS Collection Register record, albeit a short one, is illustrated in figure 1. The physical formats displayed at the bottom of the record are, for purposes of storage economy, stored as one-character codes in the 949 field. The English equivalents of the codes are generated by the screen display program when the record is displayed.

While OMSS is designed primarily as an online information retrieval system to be used with video terminals, various forms of hard copy output can be provided as well. Search results may, of course, be printed in hard copy to a hard copy terminal connected to the system or to a hard copy printer attached to a VDU connected to the system. In addition, the various files may be printed in entirety offline. As the Special Collections Department becomes more involved in regional planning and resource sharing, this capability of reproducing its records and indexes will assume an increasing importance.

SUMMARY

OMSS is a locally designed and implemented system that has been tailored to the specific requirements of manuscript collections. The system satisfies the felt need to store basic bibliographic data in a standard format that may be exchanged and integrated with other systems, while at the same time providing local flexibility and familiar means of access to the collections for researchers. Readers interested in further details concerning the OMSS should contact one of the authors at Hunter Library, Western Carolina University, Cullowhee, North Carolina.

ACKNOWLEDGMENT

This project would not have been made possible without the advice and assistance of Hiddy Morgan and George Frizzell of the library staff. ■■

Special Report: ALA-TV

Annette C. Salo

On June 28, 1983, the American Library Association presented a teleconference which shared activities of this year's ALA Annual Conference in Los Angeles. These activities ranged from a visit to the exhibits and interviews with new ALA officers to an update on new technology and the Resources and Technical Services Division Cataloging and Classification Section (RTSD/CCS) bibliographic institute. Participants at 117 remote receive sites in 43 states; the District of Columbia; Hato, Puerto Rico; and London, Ontario, Canada viewed ALA's fourth teleconference through the services of the Public Services Satellite Consortium (PSSC).

Satellite teleconferencing is one of the most exciting techniques for the distribution of information. The video teleconference has increased in popularity as satellite technology has developed over the past seventeen years. In the video teleconference, participants at remote sites view a color television program which is first transmitted live to a satellite then retransmitted to sites throughout the nation. Participants at these sites can communicate directly with the program presenters by a telephone hookup. PSSC has developed the cable library (CATVLIB) network to supply satellite access for cable systems and coordinate these signals with libraries which provide viewing facilities for video teleconferencing. The 1982 ALA Midwinter Conference President's Program was broadcast throughout the country from the PSSC headquarters in Denver, Colorado. Sixty-two sites in thirty states received the two-hour program "Marketing, A Key to Surviving and Thriving." ALA began its involvement with teleconferencing in 1978 with a program on the copyright law telecast to thirteen cities in the South and Southwest. That same year the Library and Information Technology Association (LITA) broadcast an institute from Arlington, Virginia, to Ann Arbor, Michigan, via satellite.

The 1983 video teleconference was a major program for the association. The five-hour teleconference was ALA's first live remote production. The two-part conference was a departure from the single focus of past programs.

WINDOW ON THE ANNUAL CONFERENCE

The first portion of the teleconference, "ALA Connect Time—A Window on the Annual Conference, New Library Development and Technology Nationwide," began with a warm welcome from ALA Executive Director Robert Wedgeworth. Wedgeworth gave a history of ALA teleconferencing along with a promise for more varied and specialized programs in the future. "Conference Highlights" featured a welcome from ALA President Carol Nemeyer along with highlights of the President's Program and a tour of the exhibits.

Chris Hoy, retiring conference manager, was honored at the opening of the exhibits. A tour of the exhibits was hosted by Tony Leister, Quality Books, who aptly described the exhibit area as "a microcosm of

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the library universe." A stop at the Los Angeles Public Library for the opening reception followed.

The President's Program, entitled "Library Champions," featured tributes to libraries by Librarian of Congress Daniel Boorstin, Sam Goldwyn, Jr., and Sir Richard Attenborough. Interviews with ALA incoming president Brooke Sheldon and President-Elect E. J. Josey were much too brief. "Conference Vignettes" offered a look at ALA Council and committee meetings.

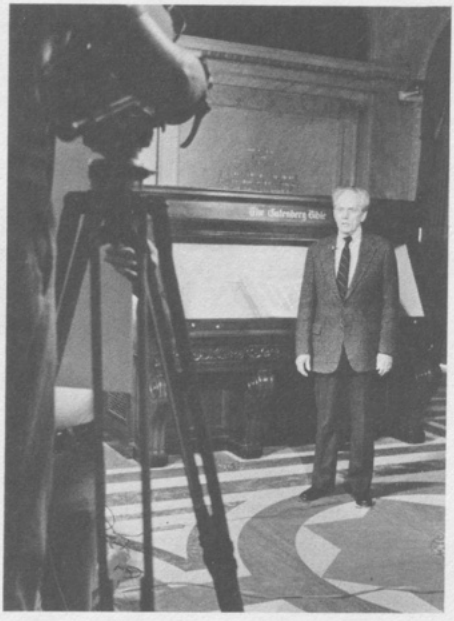
ALA public information office director, Peggy Barber, offered a sampling of library-produced television public service announcements including the 1983 John Cotton Dana Award winner from the Public Library of Columbus and Franklin County—"Lady Di." Excerpts from "Reading Rainbow," a new fall series on Vietnam, and LC's "Read More about It" bibliographies showed libraries effectively using broadcast television.

"New Technology in Libraries" provided an update on successful videodisc applications, public online catalogs, video production, and the use of microcomputers. ALA's Washington office director, Eileen Cooke, moderated the segments in this refreshing switch to the Washington, D.C., area.

The Library of Congress programs described by William Welsh are using analog and optical videodiscs to preserve priceless archival documents, films, photographs, and slides. The online public catalog provides 87 million access points for searching under every meaningful word. By combining terms in Boolean searching, the library's holdings can be quickly identified.

At the National Library of Medicine, the CITE online catalog system is searchable by subject and if needed delivers a printed copy of the user's search. NLM is involved in the production of interactive learning packets utilizing a laser videodisc and floppy diskette on an Apple II computer to train medical students.

Video production at Maryland's twelve-member Library Video Network was introduced by coordinator Lynne Bradley. Clips of PSA's "generic" staff training tapes and programs for cable made up this lively segment.



Bill Welsch discussing optical disc and preservation technology for the teleconference.

With the help of young users, Deputy Director Larry Molumby demonstrated the pilot teletext program at the Washington, D.C., Martin Luther King Library. Both content for the brief teletext information and facilities for the equipment were provided at the D.C. Library. Molumby hopes that technology will close the gap between the information haves and have-nots.

Art Plotnick, editor of *American Libraries*, closed the first portion of the teleconference with an Andy Rooney–like segment on the use of technology throughout the nation. Samples of the technology included a large university library which uses a cordless phone to communicate with users from remote stack areas, school libraries with "user-friendly" computer catalogs, and public libraries which teach computer literacy to adults and lend microcomputers.

This portion of the teleconference was technically excellent. The information was fast paced, the transitions between the segments were perfectly scripted, and the segments from television programming utilized the video medium to its fullest. The program gave a real flavor of the conference as a whole. The use of humor was

Judith Farley describing MUMS Public-Access catalog system at LC for teleconference.

helpful in setting a relaxed tone for the viewers. The teleconference was a giant step forward from the previous ALA satellite programming.

RULES AND FORMATS

The second portion of the video teleconference, "Blood, Toil, Tears, and Sweat," was presented by RTSD/CCS. Judith P. Cannan from the Library of Congress, current chair of CCS, moderated the sessions on AACR2, MARC formats, and filing rules. Beginning with an overview by D. Kaye Gapen, University of Alabama, each segment presented a dialogue between the two speakers and closed with a summary by Gapen and questions from the participants. The first topic, "AACR2 and ISBDs," featured Lucia Rather, Library of Congress, and Peter Lewis, British Library, discussing their viewpoints on the satisfactory transition to AACR2 in our nation's libraries. AACR2 was established to make a contribution to international standards, to make provision for media that exist now and media that will be developed in the future, to bring together the two texts of AACR 67 and resolve the problems they created, and to meet the needs of computerized catalogs. Rather saw AACR2 as an opportunity to encourage cooperation among countries, databases, and bibliographic utilities, while Lewis emphasized the importance of these changes on the local libraries.

The second topic, "MARC Formats," was addressed by Henriette Avram, Library of Congress, and Allen Veaner, University of California at Santa Barbara. MARC was developed by the Library of Congress as a standard format for sharing data in machine-readable form. Avram and Veaner discussed the importance of standardization and the length of the record, the economic impact of MARC, and the rapid expansion of the bibliographic networks and library automation brought about by the introduction of MARC.

"Filing Rules and Search Strategies in a MARC'd Up World," the third topic, provided a lively dialogue between Nancy John, University of Illinois at Chicago, and Joseph Rosenthal, University of California at Berkeley. Using a humorous approach, the speakers contrasted the 1980 ALA and LC filing rules and commented on their differences in philosophy and the importance of filing systems in an automated world, ending the teleconference on a positive note. Despite the difficult topic, the human approach in their skits, print examples, and dialogue served to remind us that our filing and information access systems were established to meet the needs of the user.

Judith P. Cannon Coordinator of the program.

Even though the institute seemed a bit long at times, the information provided was generally excellent. The presentations were broad enough to be understood by library generalists. The speakers clarified difficult topics by identifying acronyms the first time they were used and providing definitions. The coordinators, Cannan and Gapen, paced the program carefully; they also balanced the selection of questions from the viewers, the panelists, and the conference attendees. The RTSD officers graciously offered to answer all questions in writing for those callers whose questions remained unanswered. The origin of the phone calls was clearly identified by geographic visuals. Some phone calls were difficult to hear but the coordinator repeated the questions to make them understood for all. The packet of print materials provided a useful copy of the major discussion points.

A PROFESSIONAL PRODUCTION

PSSC coordinators Mary Diebler and Lee Lindbloom, the ALA administration, and the officers and committee members of RTSD/CCS are to be commended on the smooth organization and professional quality of this highly ambitious project. With this teleconference, ALA has passed the experimental stage and laid groundwork for a future program of teleconference activities. The successful program suggests that video teleconferences are a useful medium to present both a broad range of conference activities and a discussion of specialized issues. The teleconference can provide for increased participation in the association, bringing more awareness and democratic involvement to the varied membership. The telecast of preconference institutes and divisional conferences would seem to be the next logical step.

This writer, a four-year veteran of ALA conference attendance, viewed the conference at the Hennepin County Library—Ridgedale, Minnesota. Their new television studio provided an excellent site for viewing. The consensus of the Ridgedale audience was that the conference was interesting and informative. The catalogers commented on the opportunity they had to step away from the daily decisions and examine some of the issues. Major steps have been taken in the past few years toward standardization, automation, and international cooperation. The teleconference achieved its goals in bringing the ALA Conference closer to the profession. The only regret is that it could not have been shared with more people.

ACKNOWLEDGMENT

The writer would like to acknowledge the assistance of Emmett Davis, cataloger, Hennepin County Library, Ridgedale. ■■

LITA/Gaylord, 1983: Lawrence F. Buckland

Henriette D. Avram

Lawrence F. Buckland, founder and president of Inforonics, Inc., has been around libraries and librarians since the early sixties.

Larry graduated from the Massachusetts Institute of Technology in 1952. As an officer in the air force, he worked with data processing in intelligence applications which, with his education, provided a useful background for his future involvement

Henriette D. Avram is director for Processing Systems, Networks, and Automation Planning, Library of Congress.

with the application of technology to publishing and library problems.

Larry provided very early assistance to the formulation of the direction automation development would take at the Library of Congress. In 1964, following publication of the report, *Automation and the Library of Congress*,[1] which addressed the potential of bibliographic data in machine-readable form, Larry reported on a method to accomplish such conversion.[2] That same year, the Council on Library Resources (CLR) awarded a contract to Inforonics, Inc. to investigate whether the method recommended in Larry's earlier report would "indeed meet all foreseeable bibliographic and typographic applications of cataloging data as represented by Library of Congress catalog cards."[3] The latter report, *The Recording of Library of Congress Bibliographic Data in Machine Readable Form*, was the basis for a conference held in January 1965, sponsored by the Library of Congress, the Association of Research Libraries, and CLR. The conclusions reached by the conferees were that LC, as the major producer of bibliographic data in the United States, should make available its cataloging data in machine-readable form to the nation's libraries and should design a machine-readable record that would be agreed upon by the community and thus become a standard.

I met Larry in 1965, soon after I came to LC. My first assignment at LC, the analysis of cataloging data to create and process machine-readable records, resulted directly from the conference described above at which Larry's work was discussed. We all know the history of MARC. What is not as generally known is how important Larry's efforts were to its beginning.

As LC began this automation development, Larry immediately began formulating ideas on how local and regional libraries could tap the new resources that would be available. During this period of time, the library community was indeed fortunate to count among its members Verner W. Clapp, president of CLR from 1956 to 1967. Verner was a man of vision. He had great respect for Larry's abilities and supported many of his ideas for using the technology for more effective library services. Perhaps the most important was an early form of what we call today a bibliographic utility, that is, a single computer-based system servicing the needs of multiple libraries.

In mid-1966, the New England Board of Higher Education (NEBHE) sponsored a six-month study by Inforonics to consider the feasibility of a regional library computer center. The result was the formation of the New England Library Information Network (NELINET) administered by NEBHE.

Through additional grants given by CLR to NEBHE, which in turn contracted with Inforonics, one of the first regional library computer centers was designed and implemented. This NELINET project was conducted during the period of time that LC was still distributing records in the MARC I format. LC MARC tapes, the only data available for this early system, were loaded into the Inforonics PDP-1. Member libraries requested catalog records by keying the LC card number onto paper tape, which was transmitted to the Inforonics office. The requests were processed by the PDP-1 against the MARC file and products (catalog cards and labels) mailed back to the requesting library. The date was 1967.

This project was a pioneering effort in the use of computer technology for regular utilization of large machine-form library databases.

Larry was aware of the shortcomings of this first system and in the late 1960s he implemented an online system that included the input of original cataloging by member libraries. The second system used the PDP-10 and with the capabilities of that machine, the Inforonics system has continuously been expanding to include computer typeset and COM book catalogs, shelflist maintenance, telecommunication access via Telenet, and many other products and services. The system is available through sale or lease and has been successfully installed at Boston Public Library.

Inforonics did early studies in machine-based algorithms for library filing and explored the modification of typewriters to handle expanded character sets. Larry realized the importance of standards and all his work was within the framework of existing

standards or supporting the development of new standards that he recognized as missing. He participated in the development of the ANSC Z39.2, the format structure standard for MARC. His procedures and programs followed LC MARC to the letter.

From the beginning Larry was especially concerned with the use of "generic" records like MARC to produce specific products. His work concerned with the conversion and processing of cataloging data and his experience with MARC formatted records demonstrated to him that the most effective method of processing data for publication was the identification of items by clear identification of data elements. This was different from earlier work that tended to identify data by the characteristics of typography such as boldface. This approach permitted the production of many different by-products from a single database. His early work with a variety of professional societies, in particular with the American Psychological Society and its publication, *Psychological Abstracts*, developed his early expertise in the techniques of CRT editing, in those days not the common technique it is today, and supported his conclusions as to the benefits of item identification for machine-readable records.

Larry's publishing activities led to the early development of an advanced text processing system with database management and photocomposition services. Several well-known publications have been prepared by this system. Among them the most significant was the publication of the *American Heritage Dictionary of the English Language*, the first dictionary produced by computer and, equally as important, an early example of the economic feasibility of database publication. Inforonics was also chosen by the American Library Association to publish the catalog of core books for college libraries. This project utilized the Inforonics text processing system, which by this time had been modified to include MARC processing capabilities.

I have admired Larry from day one. Not only have I always respected his imagination and his technical ability but, more important, I continue to be impressed with him as a person, especially with his warmth and integrity. He has the talent to bring peoples of diverse interests and capabilities together and through his efforts, they act as a team and their accomplishments are rewarding. Many others have shared my feelings.

The profession is truly indebted to Larry for his pioneering efforts in library automation, networking, and electronic publishing. Rather than reject or minimize the intricate problems of bibliography, Larry constantly sought ingenious solutions to assist in automating library processes. And he still does.

Lawrence F. Buckland has been an esteemed colleague and a friend for almost twenty years. I am honored to be the one to present him with the LITA award in recognition of his many services to libraries.

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Reports and Working Papers

The USMARC Formats— Underlying Principles

The following statement of principles is intended to reflect those principles which account for the current state of the USMARC formats and to constitute a provisional set of working principles for further format development. The statement was first prepared in September 1981 by John Attig of Pennsylvania State University. Successive drafts have been discussed by the American Library Association's RTSD/LITA/RASD Committee on the Representation in Machine-Readable Form of Bibliographic Information (MARBI) and representatives of the national libraries and bibliographic networks. One such draft was published in Library of Congress Information Bulletin *(Apr. 23, 1982, 120–24) and in* Information Technology and Libraries *(1:169–74 (June 1982)) and was the subject of a hearing at the ALA Annual Conference in Philadelphia, July 1982. The version which appears here was approved by MARBI on October 29, 1982. It was published in the May 9, 1983, issue of* Library of Congress Information Bulletin *(p.148–52). It will be included as prefatory material in* MARC Formats for Bibliographic Data *and* Authorities: A MARC Format *and will be revised as necessary in the future.*

1. INTRODUCTION

1.1. The USMARC Formats are standards for the representation of bibliographic and authority information in machine-readable form.

1.2. A MARC record involves three elements: (1) the record *structure*, (2) the *content designation*, and (3) the data *content* of the record.

1.2.1. The structure of USMARC records is an implementation of the *American National Standard for Information Interchange on Magnetic Tape* (ANSI Z39.2-1979) and of *Documentation—Format for Bibliographic Information Interchange on Magnetic Tape* (ISO 2709-1973).

1.2.2. Content designation—the codes and conventions established to explicitly identify and further characterize the data elements within a record and to support the manipulation of that data—is defined in the USMARC Formats.

1.2.3. The content of those data elements which comprise a traditional catalog record is defined by standards outside the formats—such as the *Anglo-American Cataloguing Rules* or the *National Library of Medicine Classification*. The content of other data elements—coded data (see section 9 below)—is defined in the USMARC Formats.

1.3. A MARC format is a set of codes and content designators defined for encoding a particular type of machine-readable record.

1.3.1. At present, USMARC formats have been defined for two distinct types of records. *MARC Formats for Bibliographic Data* contains format specifications for encoding data elements needed to describe, retrieve and control various types of bibliographic material. *Authorities: A MARC Format* contains format specifications for encoding data elements which identify and/or control the content and content designation of those portions of a bibliographic record which may be subject to authority control.

1.3.2. The *MARC Formats for Bibliographic Data* are a family of formats defined for the identification and description of different types of bibliographic material. USMARC bibliographic formats have been defined for Books, Films, Machine-readable Data Files, Manuscripts, Maps, Music, and Serials.

1.3.3. The USMARC Formats have attempted to preserve consistency of content designation across formats where this is appropriate. However, as the formats proliferated and became more complex, definitions and usages have diverged. While complete consistency has not been achieved, a continuing effort is being made to promote consistent definition and usage across formats.

2. GENERAL CONSIDERATIONS

2.1. The USMARC Formats are communications formats, primarily designed to provide specifications for the exchange of records between systems. The communications formats do not mandate the internal formats to be used by individual systems, either for storage or display.

2.2. The USMARC Formats were designed to facilitate the exchange of information on magnetic tape. In addition, they have been widely adapted for use in a variety of exchange and processing environments.

2.3. The USMARC Formats are designed for use within the United States. An attempt has been made to preserve compatibility with other national formats. However, lack of international agreement on cataloging codes and practices has made complete compatibility impossible.

2.4. The USMARC Formats serve as a vehicle for bibliographic and authority data of all types, from all agencies. Historically and practically, the formats have always had a close relationship to the needs and the practices of the library community. In particular, the formats reflect the various cataloging codes applied by American libraries.

2.5. Historically, the USMARC Formats were developed to enable the Library of Congress to communicate its catalog records to other institutions. National agencies in the United States and Canada (Library of Congress, National Library of Canada, National Agricultural Library, National Library of Medicine, and Government Printing Office) are still given special emphasis in the formats, as sources of authoritative cataloging and as agencies responsible for certain data elements.

2.6. The institutions responsible for the content, content designation, and transcription accuracy of data within a USMARC record are identified at the record level, in field 008, byte 39, and in field 040. This responsibility may be evaluated in terms of the following rule.

2.6.1. Responsible Parties Rule.

a) Unmodified records: The institution identified as the transcribing institution (field 040 $c) should be considered responsible for content designation and transcription accuracy for all data. Except for agency-assigned data (see section 2.6.2.1. below), the institution identified as the cataloging institution (field 040 $a) should be considered responsible for content.

b) Modified records: Institutions identified as transcribing or modifying institutions (field 040 $c,d) should be considered collectively responsible for content designation and transcription accuracy. Except for agency-assigned and authoritative-agency data (see section 2.6.2. below), institutions identified as modifying or cataloging institutions (field 040 $a,d) should be considered collectively responsible for content.

2.6.2. Exceptions.

2.6.2.1. Certain data elements are defined in the USMARC formats as being exclusively assigned by particular agencies (e.g., International Standard Serial Number, Library of Congress Card Number). The content of such *agency-assigned* elements is always the responsibility of the agency.

2.6.2.2. Certain data elements have been defined in the USMARC Formats in relation to one or more *authoritative agencies* which maintain the lists or rules upon which the data is based. Where it is possible for other agencies to create similar or identical values for these data elements, content designation is provided to distinguish between values actually assigned by the authoritative agency and values assigned by other agencies. In the former case, responsibility for content rests with the authoritative agency; in

the latter case, the Responsible Parties Rule applies, and no further identification of source of data is provided. Authoritative-agency fields are:

050 Library of Congress Call Number
060 National Library of Medicine Call Number
082 Dewey Decimal Classification Number
[DDC is maintained by the Library of Congress.]

2.7. In general, the USMARC Formats provide content designation only for data which is applicable to all copies of the bibliographic entity described.

2.7.1. Information which applies only to some copies (or even to a single copy) of a title may nevertheless be of interest beyond the institutions holding such copies. The USMARC Formats provide limited content designation for the encoding of such information and for identifying the holding institutions (see, for example, subfield $5 in the 7XX fields).

2.7.2. Information which does not apply to all copies of a title, and is not of interest to other institutions, is coded in local fields (such as field 590).

2.8. Although a MARC record is usually autonomous, data elements have been provided containing information which may be used to link related records. These linkages may be implicit, through identical access points in each record, or explicit, through a linking field. Linking fields (76X-78X) may contain either selected data elements which identify the related item or a control number which identifies the related record. An explicit code in the Leader identifies a record which is linked to another record through a control number.

3. STRUCTURAL FEATURES

3.1. The USMARC Formats are an implementation of the *American National Standard for Information Interchange on Magnetic Tape* (ANSI Z39.2-1979). They also incorporate other relevant ANSI standards, such as *Magnetic Tape Labels and File Structure for Information Interchange* (ANSI X3.27-1978).

3.2. All information in a MARC record is stored in character form. USMARC communication records are coded in Extended ASCII, as defined in Appendix III.B of *MARC Formats for Bibliographic Data*.

3.3. The length of each variable field can be determined either from the "length of field" element in the directory entry or from the occurrence of the "field terminator" character [$1E_{16}$, 8-bit; 36_8, 6-bit]. Likewise, the length of a record can be determined either from the "logical record length" element in the Leader or from the occurrence of the "record terminator" character [$1D_{16}$, 8-bit; 35_8, 6-bit]. (In the past, the field terminator of the last field was omitted, and the record terminator identified the end of that field.) The location of each variable field is explicitly stated in the "starting character position" element in its directory entry.

4. CONTENT DESIGNATION

4.1. The goal of content designation is to identify and characterize the data elements which comprise a MARC record with sufficient precision to support manipulation of the data for a variety of functions.

4.2. For example, MARC content designation is designed to support such functions as:

(1) Display—the formatting of data for display on a CRT, for printing on 3″ × 5″ cards or in book catalogs, for production of COM catalogs, or for other visual presentation of the data.
(2) Information retrieval—the identification, categorization and retrieval of any identifiable data element in a record.

4.3. Some fields serve multiple functions. For example, field 245 serves both as the bibliographic transcription of the title and statement of responsibility and as the access point for the title.

4.4. The USMARC Formats provide for display constants (text which implicitly accompanies particular content designators). For example, subfield $x in field 490 (and in some other fields) implies the display constant "ISSN," and the combination of tag 780 and second indicator value "3" implies the display constant "Superseded in part by:." Such display

constants are not carried in the data, but may be supplied for display by the processing system.

4.5. The USMARC formats support the sorting of data only to a limited extent. In general, sorting must be accomplished through the application of external algorithms to the data.

5. ORGANIZATION OF THE RECORD

5.1. A MARC record consists of three main sections: (1) the Leader, (2) the Directory, and (3) the Variable Fields.

5.2. The *Leader* consists of data elements which contain coded values and are identified by relative character position. Data elements in the Leader define parameters for processing the record. The Leader is fixed in length (24 characters) and occurs at the beginning of each MARC record.

5.3. The *Directory* contains the field identifier ("tag"), starting location and length of each field within the record. Directory entries for variable control fields appear first, in tag order. Entries for variable data fields follow, arranged in ascending order according to the first character of the tag. The order of fields in the record does not necessarily correspond to the order of directory entries. Duplicate tags are distinguished only by location of the respective fields within the record. The length of the directory entry is defined in the Entry Map elements in the Leader. In the USMARC Formats, the length of the directory entry is 12 characters. The Directory ends with a "field terminator" character.

5.4. The data content of a record is divided into *Variable Fields*. The USMARC Formats distinguish two types of variable fields: *Variable Control Fields* and *Variable Data Fields*. Control and data fields are distinguished only by structure (see section 7.2 below). [The term "fixed fields" is occasionally used in MARC documentation, referring either to control fields generally or only to coded-data fields such as 007 or 008.]

6. VARIABLE FIELDS AND TAGS

6.1. The data in a MARC record is organized into fields, each identified by a 3-character tag.

6.2. According to ANSI Z39.2-1979, the tag must consist of alphabetic or numeric basic characters (i.e., decimal integers 0-9 or lower-case letters a-z). To date, the USMARC Formats have used only numeric tags.

6.3. The tag is stored in the directory entry for the field, not in the field itself.

6.4. Variable fields are grouped into blocks according to the first character of the tag, which identifies the function of the data within a traditional catalog record (e.g., main entry, added entry, subject entry). The type of information in the field (e.g., personal name, corporate name, title) is identified by the remainder of the tag.

6.4.1. For bibliographic records, the blocks are:

- 0XX = Variable control fields, identification and classification numbers, etc.
- 1XX = Main entry
- 2XX = Titles and title paragraph (title, edition, imprint)
- 3XX = Physical description
- 4XX = Series statements
- 5XX = Notes
- 6XX = Subject added entries
- 7XX = Added entries other than subject, series
- 8XX = Series added entries
- 9XX = Reserved for local implementation

6.4.2. For authority records, the blocks are:

- 0XX = Variable control fields, identification and classification numbers, etc.
- 1XX = Heading
- 2XX = General see references
- 3XX = General see also references
- 4XX = See from tracings
- 5XX = See also from tracings
- 6XX = Treatment decisions, notes, cataloger-generated references
- 7XX = Not defined
- 8XX = Not defined
- 9XX = Reserved for local implementation

6.5. Certain blocks contain data which may be subject to authority control (1XX, 4XX, 6XX, 7XX, 8XX for biblio-

graphic records; 1XX, 4XX, 5XX for authority records).

6.5.1. In these blocks, certain parallels of content designation are preserved. The following meanings are generally given to the final two characters of the tag:

X00 = Personal name
X10 = Corporate name
X11 = Conference name
X30 = Uniform title heading
X40 = Bibliographic title
X50 = Topical subject heading
X51 = Geographic name

Further content designation (indicators and subfield codes) for data elements subject to authority control are consistently defined across the bibliographic formats and in the authorities format. These guidelines apply only to the main range of fields in each block, not to secondary ranges such as the linking fields in 760-787 or the 87X fields. [Numerous exceptions to this principle presently exist in the formats.]

6.5.2. Within fields subject to authority control, data elements may exist which are not subject to authority control and which may vary from record to record containing the same heading (for example, subfield $e, Relator). Such data elements are not appropriate for inclusion in the 1XX field in the authorities format.

6.5.3. In fields not subject to authority control, each tag is defined independently. However, parallel meanings have been preserved whenever possible.

6.6. Certain tags have been reserved for local implementation. Except as noted below, the USMARC Formats specify no structure or meaning for local fields. Communication of such fields between systems is governed by mutual agreements on the content and content designation of the fields communicated.

6.6.1. The 9XX block is reserved for local implementation.

6.6.2. In general, any tag containing the character "9" is reserved for local implementation within the block structure (see section 6.4 above).

6.6.3. The historical development of the USMARC Formats has left the following

exceptions to this general principle:
009 Physical description fixed field for archival collections
039 Level of bibliographic control and coding detail
359 Rental price
490 Series untraced or traced differently

6.7. Theoretically, all fields (except 001 and 005) may be repeated. However, the nature of the data often precludes repetition. For example, a bibliographic record may contain only one title (field 245) and an authority record, only one entry (1XX fields). The repeatability/nonrepeatability of each field is defined in the USMARC Formats.

7. VARIABLE CONTROL FIELDS

7.1. 00X fields in the USMARC Formats are variable control fields.

7.2. Variable control fields consist of data and a field terminator. They do not contain either indicators or subfield codes (see section 8.1 below).

7.3. Variable control fields contain either a single data element or a series of fixed-length data elements identified by relative character position.

8. VARIABLE DATA FIELDS

8.1. Three levels of content designation are provided for variable data fields in ANSI Z39.2-1979:
(1) a three-character tag, stored in the directory entry;
(2) indicators stored at the beginning of each variable data field, the number of indicators being reflected in the Leader, byte 10; and
(3) subfield codes preceding each data element, the length of the code being reflected in the Leader, byte 11.

8.2. All fields except 00X are variable data fields.

8.3. *Indicators*

8.3.1. Indicators contain codes conveying information which interprets or supplements the data found in the field.

8.3.2. The USMARC Formats specify two indicator positions at the beginning of each variable data field.

8.3.3. Indicators are independently defined for each field. However, parallel meanings are preserved whenever possible.

8.3.4. Indicator values are interpreted independently—i.e., meaning is not ascribed to the two indicators taken together.

8.3.5. Indicators may be any lower-case alphabetic or numeric character or the blank. Numeric values are assigned first. A blank is used in an undefined indicator position, or to mean "no information supplied" in a defined indicator position.

8.4. *Subfield Codes*

8.4.1. Subfield codes distinguish data elements within a field which do (or might) require separate manipulation.

8.4.2. Subfield codes in the USMARC Formats consist of two characters—followed by a data element identifier. A delimiter [$1F_{16}$, 8-bit; 37_8, 6-bit]. Identifiers defined in the USMARC communications formats may be any lower-case alphabetic or numeric character.

8.4.2.1. In general, numeric identifiers are defined for parametric data used to process the field, or coded data needed to interpret the field. (Note that not all numeric identifiers defined in the past have in fact identified parametric data.)

8.4.2.2. Alphabetic identifiers are defined for the separate elements which constitute the data content of the field.

8.4.2.3. The character "9" and the following graphic symbols are reserved for local definition as subfield indentifiers: 9 ! "#$%&'()* + ,-./:;< = >?

8.4.3. Subfield codes are defined independently for each field. However, parallel meanings are preserved whenever possible.

8.4.4. Subfield codes are defined for purposes of identification, not arrangement. The order of subfields is specified by content standards, such as the cataloging rules. In some cases, such specifications may be incorporated in the format documentation.

8.4.5. Theoretically, all data elements may be repeated. However, the nature of the data often precludes repetition. The repeatability/nonrepeatability of each subfield code is defined in the USMARC Formats.

9. CODED DATA

9.1. In addition to content designation, the USMARC Formats include specifications for the content of certain data elements, particularly those which provide for the representation of data by coded values.

9.2. Coded values consist of fixed-length character strings. Individual elements within a coded-data field or subfield are identified by relative character position.

9.3. Although coded data occurs most frequently in the Leader, Directory and Variable Control Fields, any field or subfield may be defined for coded-data elements.

9.4. Certain common values have been defined:

b = Undefined
n = Not applicable
u = Unknown
z = Other
| = Fill character [i.e., No information provided]

Historical exceptions do occur in the formats. In particular, the blank (b) has often been defined as "not applicable," or has been assigned a meaning. ■■

The CLR OPAC Study: Analysis of ARL User Responses

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An analysis of responses of ARL library users to the CLR Online Public Access Catalog Study shows that the nature of the searching capabilities of a given system will affect what information users bring to a search and how the search is conducted. The study also shows that regardless of the capabilities of a particular system that the size and currency of the database are a major factor in determining overall user satisfaction.

INTRODUCTION

This study analyzes questionnaire responses of users of ARL libraries who participated in the CLR Online Public Access Catalog Study[1] and compares them with those of public library users. The study also analyzes questionnaire data from three individual ARL libraries and compares them to those of all the ARL libraries in the study and to each other. Of particular interest is whether different system capabilities affect users' responses and if so how.

The study focuses primarily on the first of the four-part user questionnaire which deals with questions about the type of information people bring and use when they search in an online catalog, how and why they search, how much they retrieve, and how satisfied they are with the results. The responses of these questions are compared with the characteristics of the respondents found in the fourth part of the questionnaire. The user characteristics of particular interest are frequency of use of the library, the academic area of the respondent, and the academic status of the respondent—whether undergraduate, graduate student, faculty member, etc.

The individual ARL online catalog systems selected for this analysis were the MELVYL system, the Syracuse University SULIRS system, and the Ohio State LCS system. The MELVYL system at the time the survey was conducted was a static prototype system containing approximately 730,000 records representing partial holdings of the nine campuses of the University of California. Its features include: author,

title, author/title, subject heading, and series access; keyword or term searching of corporate authors, titles, series, and subjects; the Boolean operators AND, OR, and NOT; and the ability to limit searches by publisher, year of publication, place of publication, and library location.[2]

The Syracuse University SULIRS system evolved from an in-process system and became a public access system in July 1980 using derived search keys and without subject access. In May 1981 the search capability was expanded to include free text searching of all fields including author, title, subject, and series. Also, the Boolean AND allows combining words from the same or different fields. At the time of the survey the database contained approximately 500,000 records, which represented most of the libraries post-1971 additions to the collection.[3]

The Ohio State University LCS system began as a circulation system in 1970 and was expanded to include full MARC records and subject searching in June 1978. The database is currently maintained and contains about 1.5 million records. While it provides author, title, author/title, subject heading, and series access, it lacks Boolean search capabilities and the ability to narrow searches except by selecting serials or monographs.[4]

While the three systems do have different capabilities, the primary reason for selecting them was that they represented the overwhelming majority of ARL responses in the survey. Of the 4,701 total ARL responses, these three systems provided 3,845. The four remaining ARL libraries produced only 856 responses, with no one institution having enough responses to be very useful for analysis.

LIMITATIONS OF THE SURVEY

As with any survey there are a number of problems with the data that were collected. One problem is the very high rate of incomplete responses from users of the MELVYL system. The MELVYL questionnaire was administered online following the completion of a searching session. In a number of cases the person filling out the questionnaire stopped before completing it, resulting in between two and three hundred invalid MELVYL responses for each cross-tabulation. If one assumes that the responses of those who did not complete the questionnaire are statistically similar to those who did, there would be no need for concern. But if people who were dissatisfied expressed that dissatisfaction by failing to complete the questionnaire, then some of the conclusions could be suspect.

Also, there is a problem with differences in the databases of the selected systems during the data collection period. The MELVYL database was a static prototype, and had had no records added since 1981. The Ohio State database was and is currently maintained and represents all of that institution's holdings; however, subject headings exist only for records added in the last five years. As will be seen later, the differences in these databases affect the way users responded to various questions.

INFORMATION USERS BRING TO A SEARCH

In spite of these difficulties, an analysis of the responses shows a number of interesting findings. Chart 1 shows what information users bring to their searches. It is evident that differences exist between the responses of ARL library users and public library users but they are not dramatic. The percentage of people who bring author information to their search is somewhat higher for ARL users than for public library users, but the differences in the percentage of people bringing title or subject information between the two groups is slight. It should be noted that the percentages in chart 1 represent the items brought to a search by a user, and because one user often brought more than one item, the total percentage exceeds 100%.

Chart 1. Types of Information Brought to a Search

	Complete Author	Partial Author	Total Author	Complete Title	Partial Title	Total Title	Topic Words	Subject Headings	Total Subjects
ARL	44.6%	14.1%	58.7%	40.5%	11.8%	52.3%	27.7%	41.5%	69.2%
Public	39.1%	9.9%	49.0%	38.5%	9.5%	48.0%	25.4%	48.4%	73.8%

Chart 2. Types of Information Brought to a Search

	Complete Author	Partial Author	Total Author	Complete Title	Partial Title	Total Title	Topic Words	Subject Headings	Total Subjects
Melvyl	20.7%	7.3%	28.0%	15.8%	5.8%	21.6%	19.9%	28.7%	48.6%
Syracuse	22.6%	7.6%	30.2%	21.0%	6.0%	27.0%	17.7%	21.6%	39.3%
Ohio St.	25.1%	6.7%	31.8%	24.2%	5.2%	29.4%	11.3%	22.0%	33.3%

Chart 2 shows what information users of the individual ARL systems bring to their searches. As can be seen, the variations are somewhat greater than between the public and ARL libraries: 31.8% of Ohio State users bring author information as opposed to 28% of MELVYL users. There is a wider variation in those who bring title information, with 29.4% of Ohio State users bringing title information while 21.6% of MELVYL users bring titles. When comparing users bringing subject information, there is a significant difference—48.6% of MELVYL users bring subject information while only 33.3% of Ohio State users do. It seems clear that there are significant differences in what a user brings to a search based on what system is used, reflecting user expectations of each system—a function of prior experience. The method of calculating percentages in this chart differs from that of chart 1 in that the percentages here are of total items brought rather than of total users. However, because the percentage of users who brought call numbers was not included, the total is somewhat less than 100%.

Chart 3 compares the percentage of subject headings brought by MELVYL and Ohio State users based on the frequency of their use of the library. Of Ohio State users who come to the library four times a year, 59.2% bring subject headings whereas only 33% of daily users do. For MELVYL users there is a very different pattern. The proportion of MELVYL users who bring subject headings actually increases from 45.8% for four-times-a-year users to 49.5% for daily users. This is a case where a significant difference exists in the way the two systems are used; again, a reflection of system capabilities.

Chart 3. MELVYL and Ohio State Users Who Brought Subject Heading to a Search by Frequency of Use of the Library

	Daily	Weekly	Monthly	4 Times a Year
Melvyl	49.5%	52.9%	44.9%	45.8%
Ohio State	33.0%	42.0%	47.5%	59.2%

The fact that users with different subject backgrounds bring different information to a search is not surprising. Users in Education, Humanities, and Social Sciences tend to bring more author/title information and less subject information than do those in Business, Engineering, and Science. Engineers, interestingly enough, bring less complete author and complete title information than any other group but bring more partial author and title information. This may indicate that engineers have discovered more quickly than others that it is not necessary to bring a complete author or complete title to search an online catalog.

Examining what people bring to a search based on their academic status shows a rather clear pattern as illustrated in chart 4. A ranking technique is used to show the relative strengths of the elements within each row. Chart 4 shows that 39.3% of all users bring complete author information. If there were no differences based on academic status one would find that the numbers in each of the categories within the complete author row were very close to 39.3% but that is not the case. One finds that 51.9% of faculty bring complete authors, while only 34.9% of freshmen and sophomores do. This chart shows that freshmen/sophomores and juniors/seniors rank relatively low in bringing author and title information but rank high in bringing topic words and subject headings, while doctoral students and faculty rank high in bringing author and title information and low in bringing topic words and subject headings.

Comparing the kind of information users of individual systems bring to their search based on their academic status shows a pattern of particular interest. Chart 5 compares the percentage of users by academic status who bring subject headings to a

Chart 4. Types of Information Brought to a Search by Academic Status

	Freshman-Sophomore 1	Junior-Senior 2	Graduate-Master's Level 3	Graduate-Doctoral Level 4	Graduate Professional 5	Faculty 6	Staff 7	Other Status 8	Total
Requests	8	6	5	2	7	1	3	4	
Complete Author	34.9%	35.6%	40.4%	51.1%	36.2%	51.9%	44.3%	42.0%	39.3%
	8	7	4	1	2	5	3	6	
Part Author's Name	11.1%	14.2%	24.8%	30.3%	26.7%	23.1%	25.2%	16.9%	18.0%
	7	5	2	1	8	4	3	6	
Complete Title	33.1%	34.1%	41.5%	43.8%	32.4%	35.9%	39.7%	33.2%	36.1%
	8	7	4	2	3	6	1	5	
Part Title	10.4%	12.4%	20.5%	22.7%	21.0%	17.3%	26.0%	18.1%	15.5%
	2	3	5	7	1	8	6	4	
Topic Word or Words	31.6%	31.2%	27.9%	16.7%	33.3%	15.4%	19.1%	29.2%	28.1%
	2	1	5	7	4	8	6	3	
Subject Headings	46.2%	46.9%	32.6%	25.7%	39.0%	20.5%	30.5%	45.2%	40.5%

search for the MELVYL and Ohio State systems. The freshman/sophomore group for both systems is almost identical at about 52%, and the numbers remain relatively close for juniors/seniors, with MELVYL users at 50.7% and Ohio State users at 49.5%. The percentages for graduate master's students begin to show a difference, with Ohio State users dropping to 30.5% while MELVYL users drop to only 44.6%. The difference becomes greater with more advanced users: 42.9% of MELVYL faculty users bring subject headings whereas only 10.5% of the Ohio State faculty users do. This represents a significant difference in the use of the two systems and their capabilities—MELVYL offering a more sophisticated subject search capability.

It was the intent of this study to look at what people actually use in searching compared to what they brought, but it turned out that the patterns were virtually identical. People did bring complete author and complete title information and used partial authors and partial titles in a number of cases, but the overall patterns remained unchanged. One question that should be considered is whether it is reasonable to expect people after they have completed a search to differentiate what they brought from what they used.

INFORMATION SOUGHT AND FOUND BY USERS

What are people trying to find when conducting a search in an online catalog? Chart 6 shows what users of ARL and public libraries as well as users of the three individual ARL systems are trying to find. The percentage of users of public and ARL libraries looking for specific books and books on topics are relatively close, and the percentage of those looking for books by a particular author are almost identical. A comparison of the individual ARL library systems shows considerably more variation. MELVYL users are significantly less interested in looking for specific books than are users of the Syracuse or Ohio State systems. Looking at the percentage of users interested in books on a topic shows that 59.5% of MELVYL users want books on a topic while only 47.7% of Ohio State users do. It is somewhat interesting to note that the use of the MELVYL system for finding books on a topic is considerably higher than the public library group.

WHY USERS NEED INFORMATION

Why do people need the information for which they are searching? Probably the an-

Chart 5. MELVYL and Ohio State Users Who Brought Headings to a Search by Academic Status

	Freshman Sophomore	Junior Senior	Graduate Master's	Graduate Doctoral	Graduate Professional	Faculty	Staff	Other
Melvyl	52.3%	50.7%	44.6%	46.2%	41.2%	42.9%	43.5%	53.2%
Ohio St.	52.8%	49.5%	30.5%	23.5%	35.7%	10.5%	18.8%	32.7%

Chart 6. What Users Were Trying to Find

	Public	ARL	Melvyl	Syracuse	Ohio State
Specific Book	49.4%	52.3%	36.4%	55.0%	57.2%
Book on Topic	53.9%	51.0%	59.5%	53.5%	47.7%
Books by Author	23.5%	24.5%	24.6%	24.8%	22.6%

swer to this question is more useful in understanding why people use research libraries than it is in helping to design online catalogs.

Chart 7 shows why users need the information, comparing the ARL group to the public library group. The figures here are not surprising. The use of public libraries for recreation, fixing things, work, personal interests, and hobbies is significantly higher than for the ARL group, while ARL users are significantly more interested in class readings, reports, theses, and publications and teaching. Keeping up with topics is relatively even, suggesting that this category was interpreted in a variety of ways.

Some general observations about the information needs of users of ARL libraries can be made. There is considerably more general and recreational use of research libraries than one might expect. Use for course reading is fairly even regardless of subject area; however, use for course papers varies by subject with higher use by those in Business, Social Sciences, and Education and lower use by those in Medicine, Engineering, and Science.

Chart 8 compares why users of the individual ARL systems need information, and here there are some rather interesting differences. Users of MELVYL are considerably more interested in non-course related reading than users of the Syracuse system, while use of the Syracuse system for class reading and class reports is significantly higher than either of the other two systems.

THE AMOUNT OF INFORMATION FOUND IN USING AN ONLINE CATALOG

How much do people find when searching in online catalogs? Chart 9 shows relatively little difference between users of public and ARL libraries. Those using public libraries do have a somewhat higher occurrence of finding more than they wanted than do users of ARL libraries. A few more public library users also find all that they want, and there is a slightly higher incidence of ARL users finding some of what they want or nothing. However, one is struck more by the similarities than by the differences.

A comparison of the three ARL systems shows considerably more variation. Only 11.8% of MELVYL users find more than they want, which might indicate superior precision over the other systems or the fact that the database was fixed and not growing at the time of the study. But the percentage of people finding all of what they want is only 13.5% for MELVYL users, whereas for Ohio State users it is 31.4%. An examination of the percentage of users who

Chart 7. The Reason for Seeking Information

	Recreation	Fixing	Work	Personal	Hobby	Class	Report	Thesis	Publications	Teaching	Keeping-Up
ARL	12.6%	1.8%	14.8%	23.2%	6.0%	33.0%	45.1%	11.7%	7.5%	4.6%	13.4%
Public	31.1%	7.2%	17.0%	50.6%	13.6%	17.4%	21.1%	3.9%	3.3%	3.7%	15.1%

Chart 8. The Reason for Seeking Information

	Recreation	Fixing	Work	Personal	Hobby	Class	Report	Thesis	Publications	Teaching	Keeping-Up
Melvyl	17.1%	2.3%	12.3%	27.9%	10.0%	28.4%	38.6%	11.2%	7.5%	4.5%	14.7%
Syracuse	8.7%	1.1%	17.2%	20.5%	3.4%	36.9%	54.8%	7.6%	5.8%	4.3%	12.0%
Ohio St.	14.9%	2.3%	11.6%	24.6%	7.9%	34.4%	42.2%	12.0%	6.9%	5.1%	15.4%

Chart 9. The Amount Found When Using an Online Catalog

	More Than	All	Some	Nothing
Public	19.7%	31.7%	34.1%	14.6%
ARL	14.8%	26.3%	40.2%	18.7%
Melvyl	11.8%	13.5%	43.2%	31.5%
Syracuse	14.7%	25.8%	40.6%	18.9%
Ohio St.	19.5%	31.4%	37.3%	11.9%

find nothing shows that 31.5% of MELVYL users find nothing as compared with 11.9% for Ohio State users and 18.9% for Syracuse users. Clearly the fact that the MELVYL database is a prototype had an impact on user response to this question.

A number of observations can be made about how much users find based on certain characteristics. Frequent users tend to find more than infrequent users. There is no consistent pattern when looking at what people find based on their subject background; however, some general observations can be made: those in Medicine tend to retrieve a great deal; those in Business and interdisciplinary subject areas are somewhat unsuccessful; and those in the Humanities fall in the middle of that range. The patterns produced by user responses in the other subject areas are contradictory, with very high retrieval rates for users of some systems and low rates for users of others. Looking at how much users find based on academic status shows that faculty and staff lead in finding more or all of what they wanted but faculty also lead in finding nothing.

USER SATISFACTION

Finally, it is interesting to compare what people find with how satisfied they are. Chart 10 shows this comparison for the ARL group. It is somewhat surprising that whether people find more than they want or all that they want makes little difference in how satisfied they are. Of the people who find more than they want, 81.3% are very satisfied, while 82.7% of those who find all that they want are also very satisfied. It is also surprising that 6.9% of the people who find nothing are very satisfied and 12.9% of the people who find nothing are somewhat satisfied.

An objective of this study was to look at user satisfaction and the users' overall reaction to the online catalog as compared with the card catalog, but users were so positive in their responses that little useful information could be obtained. Chart 11 shows the users' view of the online catalog in terms of being better, the same, or worse than the card catalog and compares that view with how satisfied they are. Of the users who are very satisfied, 85% think the online catalog is better. But 45.5% of the users who are very unsatisfied still think the online catalog is better than the card catalog and nearly 70% of those who are very unsatisfied think the online catalog is better than or the same as the card catalog. Clearly users believe regardless of its imperfections that the online catalog is as good or better than the card catalog.

Chart 10. The Amount Found When Using an Online Catalog by Level of Satisfaction

	More	All	Some	Nothing
Very Satisfied	81.3%	82.7%	20.8%	6.9%
Somewhat Satisfied	15.5%	15.8%	62.3%	12.9%
Somewhat Unsatisfied	2.3%	0.9%	14.6%	24.9%
Very Unsatisfied	0.9%	0.6%	2.3%	55.4%

Chart 11. The Online Catalog Compared to the Card Catalog by Level of Satisfaction

	Better	Same	Worse
Very Satisfied	85.0%	12.6%	2.4%
Somewhat Satisfied	75.0%	17.9%	7.1%
Somewhat Unsatisfied	55.2%	25.3%	19.5%
Very Unsatisfied	45.5%	24.4%	30.1%

SUMMARY

What assumptions can be drawn from these data? First, users are adaptable. They will bring information to an online catalog that they believe will be useful in conducting a search. And as can be seen, a reasonably similar group using three different systems bring significantly different information based presumably on different

system capabilities and user expectations born out of previous experience with the systems.

Second, the quality or more accurately the size and currency of the database is extremely important to overall user satisfaction. Probably if there were a choice between more sophisticated systems or more complete databases, the results of this survey would argue for the more complete databases. Users of the MELVYL system search in a more sophisticated manner than do users of the Ohio State system, but MELVYL users are clearly not as satisfied presumably because of the inadequacy of the database.

Third, there is a need to look in more detail at subject searching using online catalogs. The fact that the more advanced users of the MELVYL system, the graduate students and faculty, use that system in a more subject-oriented way than do users of the other systems is significant. It may be that MELVYL users are searching for subjects because they are unable to find the specific items that they want in the database. It may be that they regard the system as a prototype and are using it to experiment rather than to actually do work. But it may also be that as systems improve in terms of subject searching, more and more advanced users will use subject searching capabilities. Future studies of subject searching should also monitor the use of the Ohio State system. In its early stages of development, this system lacked subject access and therefore produced a group of users accustomed to having only author and title access. The expanded capability of the Ohio State system to provide subject access combined with a user education program may shift system use to a pattern more like that of MELVYL users. Whichever pattern evolves as the dominant one, it will have an impact on the design of online catalogs.

Finally, and possibly most important, it is clear that library users want online catalogs to succeed. It is difficult in many cases to get useful information because they are so positive. They want online catalogs to succeed, and they want to use them. Even if they are at times frustrated with these systems, they find the online catalog to be better than the card catalog.

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2. Joseph R. Matthews, *Public Access to Online Catalogs* (Weston, Conn.: Online, Inc., 1982) p. 284–94.
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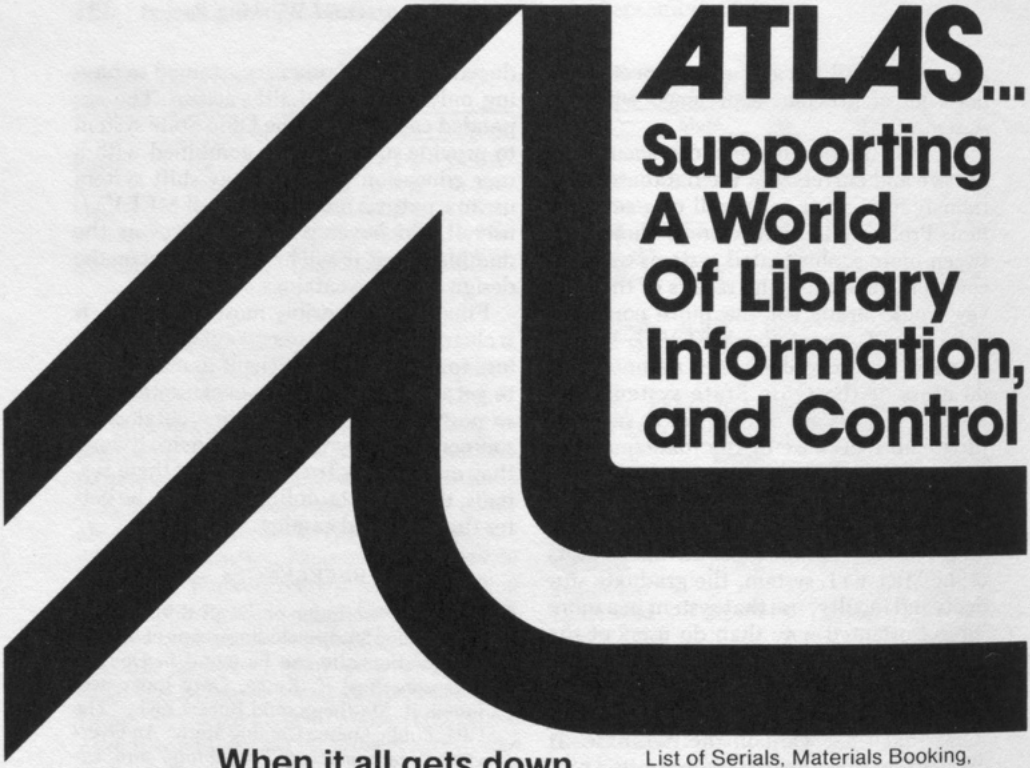

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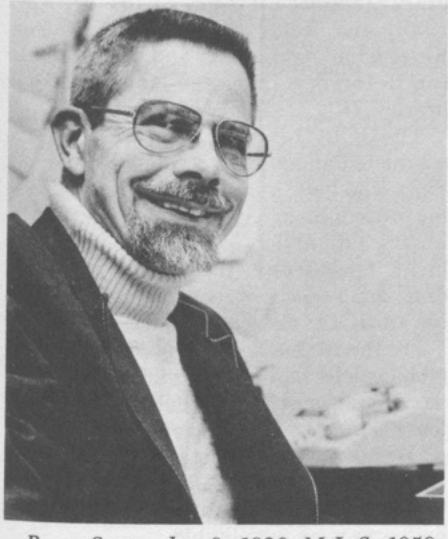
In Memoriam: Ted Hines



Born: September 9, 1926; M.L.S. 1958, Ph.D. 1960, Rutgers University; Taught at: Rutgers University, Columbia University, University of North Carolina at Greensboro; Died: June 25, 1983.

When I first met Ted Hines in 1965, I felt I must have impressed him. He had a way of reinforcing everything I said. He indicated that my ideas were "unique" and that they were important both to him and to others. This reinforcement was extremely important to me and influenced me at a very critical time in my life.

His encouragement had such a positive influence on me that I didn't mind at all when in later years I ran into many dozens of Ted's ex-students *all claiming the same thing*. They swore he had reinforced them at a critical time. They all felt singled out by Ted as exceptional people with exceptional and important ideas.

How could he have done that? How could he have made us *all* feel so unique? So unique that we all tried to pull ourselves up to our newly perceived levels. He helped each of us redefine ourselves.

Although this is not the kind of human quality that fits into checkoff lists one finds in personnel folders, one can't help wishing. Imagine an entry like "enormously inspiring" or "major influence on students' sense of worth." And while we're wishing, how about some cross-references in those personnel files maybe like: Inspiration *see also* Ted Hines, or better yet: Ted Hines *see also* Greatness.

Ted left his mark on many of us, and the profession is the better for it.—*Dick Kollin, Senior Vice President, Science and Technology, Institute for Scientific Information, Philadelphia.*

News and Announcements

IBM to Manufacture New OCLC Terminal

OCLC has announced that IBM will manufacture the OCLC Model 300 terminal. The IBM-PC, customized by OCLC, will enable a library to access OCLC's central online system for OCLC processes and products as well as run IBM-compatible software locally.

Under terms of the agreement, OCLC will become a "value-added dealer" of the IBM Personal Computer (PC) for the library community. The OCLC Model 300 will be an IBM PC with custom modifications specified by OCLC, including OCLC's unique telecommunication protocol, a terminal-chaining capability, a special keyboard, and the ALA character set. With the Model 300 terminal, a library will be able to use fully OCLC's online system and, when desired, use the terminal as a personal microcomputer taking advantage of OCLC-developed custom software packages and IBM or IBM-compatible software packages. OCLC already has under development software enhancements and its Micro Enhancer project which streamlines OCLC Interlibrary Loan functions.

OCLC expects the new Model 300 terminal will be available for installation in the first quarter of 1984. The price of the new terminal has not been set. ■■

ITAL Authors Win OCLC Awards

Two of the four winners of the 1982–83 OCLC Library Literature Contest are *ITAL* articles. Carolyn A. Johnson was honored for "Retrospective Conversion of Three Library Collections" (*ITAL* 1:33–39, June 1982). Izabella Taylor won with "Automated and Manual ILL: Time Effectiveness and Success Rate" (*ITAL* 1:277–80, Sept. 1982). Other awardees were Brenda G. Corbin for "Effective Use of OCLC in a One-Person Astronomy Library" (*Special Libraries* 73:151–54, Apr. 1982) and Betsy Baker and Kathleen Kluegel for "Availability and Use of OCLC for Reference in Large Academic Libraries" (*RQ* 21:379–83, Summer 1982).

The OCLC Library Literature Contest is conducted annually to recognize those authors who have published articles addressing procedures or techniques that pertain to library automation in the OCLC environment. Specifically, the articles must address some aspect of using or preparing to use an OCLC service, product, or system.

For the 1982–83 contest period, to be eligible articles had to be a minimum of 500 words and must have been published in a journal indexed in *Library Literature*. Eligible entrants included staff members from OCLC participating institutions; however, the staffs of OCLC and affiliated regional networks were not eligible.

Each of the authors of the winning articles for 1982–83 will receive a cash award. These articles were selected by a panel of OCLC staff as best representing the kind of information sharing the contest was designed to foster. ■■

Grant to Develop Device to Protect Books When Photocopied

The American Library Association's *Library Technology Reports (LTR)* unit has received a $64,400 grant from the National Endowment for the Humanities Division of Research Programs to develop a device to allow bound volumes to be photocopied without damaging the binding.

The engineering and protype contract for the project has been awarded to Morgan Data Conversion, Inc., a Mountain View, Calif., research and development company noted most recently for designing and building highly specialized equipment for

the micrographics and printing industries. The project director is Howard S. White, editor of *Library Technology Reports.*

Since the first photocopiers were installed in libraries, librarians have been concerned with books being damaged as a consequence of being flattened on the machine's glass platen. Librarians have sought to remedy this problem but have yet to discover a practical solution. Through this project, *Library Technology Reports* hopes to develop a special device that would be used with an existing plain-paper copier that would allow a book to be copied while being held face-up and open, but not opened more than about 90 degrees.

After the device has been built and tested, it will be exhibited at various library meetings and otherwise publicized; a complete report of the project will be published in *LTR;* and hopefully, the device will be manufactured and sold at an affordable price. ■■

Chemical Research Journals Available Online

The full text of eighteen journals of the American Chemical Society (ACS) will be offered online beginning June 1, 1983. In a joint announcement Bibliographic Retrieval Services, Inc. (BRS) and ACS said that the full text of the research journals will be available to search, display, and print. The computer-based file will initially contain approximately 25,000 documents dating from 1980 to the present. The file will be updated every two weeks in order to provide information on a highly current basis. Initiation of the service is the result of favorable response by about 500 volunteers who evaluated the usefulness of online access to the ACS primary journal file in experiments conducted during 1981 and 1982.

The search capability of the new service will allow users to employ natural language to locate important information that could be overlooked by the searching of title words and index terms only. Standard Boolean operators (AND, OR, NOT) combined with adjacency or proximity features will permit powerful and easy searching of the full text. Search results will be displayable immediately on the terminal screen or will be available for either online or offline printing.

For information, contact: BRS, Inc., Customer Service, (800) 833-4707. ■■

Multicomponent Electronic Encyclopedia

Grolier Incorporated and the Longman Group of S. Pearson and Sons of Great Britain have agreed to jointly produce pilot materials for the audiovisual segment of a proposed multicomponent electronic encyclopedia.

The audiovisual segment, scheduled to be completed by the end of 1983, will provide a model for developing a free-standing information corpus. This, when combined with the computer-generated encyclopedia text, will form an electronic general encyclopedia.

The jointly planned prototype involves the production of the audiovisual component under the direction of Longman Video and the ongoing development of the text database by Grolier. A successful prototype will lead to producing a complete set of random access interactive videodiscs for test marketing purposes.

Grolier's electronic edition of the *Academic American Encyclopedia*—in text only form—has proven to be a popular offering in the U.S. by such online/videotex services as Dow Jones News/Retrieval and BRS.

Combining laser videodisc technology with computer-generated text, this proposed electronic encyclopedia will allow the user/researcher to view on a TV monitor concepts difficult to visualize in print, to watch news footage of historical events, to listen to a composer's symphony or hear and see speeches by great figures of the past. The computer-generated text can be updated continually. ■■

Biblio-Techniques Acquires Circulation Software

Biblio-techniques has acquired Detailed Holdings and Circulation Control Software from Washington State University, where the system has operated for over two

years. Biblio-techniques is in the process of modifying the system for integration with BLIS, a version of the Washington Library Network (WLN) software that the firm offers. The holdings and circulation software was designed at Washington State University to be integrated with WLN software and uses ADABAS, the database management system used by BLIS and WLN. ■■

EPB Newsletter

EPB: Electronic Publishing and Bookselling, a new newsletter published by the Oryx Press, is designed to provide up-to-date information on computer systems that have been installed and are working for publishers, booksellers, and other information professionals. Edited by Sandra K. Paul, *EPB* will begin bimonthly publication in September 1983.

Each issue of *EPB* will cover—in English, not "computerese"—the latest computer applications in publishing, bookselling, and related fields, including: text editing and computer composition; general business management; accounting; sales and inventory control; scanning; royalties; personnel and payroll; production estimating and scheduling; book fulfillment; magazine advertising; co-op advertising; list maintenance; promotion; warehousing; and other developments as they unfold in these rapidly developing areas.

In the area of electronic dissemination of information, *EPB* will cover on-demand printing, database publications, videotex, teletext, videodisc, and computer software publications.

Articles in *EPB* will be written by publishers, booksellers, and vendors describing firsthand their triumphs and setbacks with new computer systems. In-depth interviews with major industry figures will reveal their latest plans and thoughts. Regular columns will contain reviews of books and news drawn from hundreds of sources including the countless journals covering the information industry.

Regular Features in *EPB* will include:

- "New Systems": A regular column reporting on new computer systems purchased by publishers, booksellers, or service bureaus supporting the book trade or on new applications of existing systems.
- "Scan/News": This column will report on the latest developments concerning machine-readable codes on book covers and applications by publishers, booksellers, and wholesalers.
- Letters to the editor, interviews, feature articles, in-depth news, and case studies. ■■

Northwestern to Offer NOTIS Services

Northwestern University has made a long-range commitment to offer its integrated, comprehensive library system to libraries in the United States and abroad, according to university librarian John P. McGowan.

The library system, known as NOTIS (Northwestern Online Total Integrated System), is an operationally tested set of computer programs with full documentation and procedural manuals. It has an online catalog component, which enables library patrons and staff to locate items held or on order and to determine their status, as well as library materials management component, which supports such library operations as acquisitions, serials check-in, cataloging, authority control, catalog maintenance, and circulation services.

"NOTIS development began in 1967, and it is now a third-generation system," McGowan said, adding that it has been in continuous use in the Northwestern University Library system since 1970 and that each successive version of NOTIS "has built on the strengths of the previous version."

He said that the NOTIS software package may be licensed either on an annual or on a permanent basis, and is available for use on IBM or IBM compatible equipment. NOTIS uses standard programming languages, and maintenance includes enhancements to programs, as developed, and assistance in installation and use of the system.

The NOTIS system was installed at the Biblioteca Nacional, Caracas, Venezuela, in May 1979 and is being installed at the Biblioteca Nacional, Santiago, Chile. Other users of the NOTIS software include the University of Florida; University of

South Alabama; Central State University (Edmond, Oklahoma); Washington University (St. Louis); and the University of Cincinnati.

The NOTIS library system will be installed at Clemson University and at Harvard University later this year.

McGowan said that because NOTIS supports internationally recognized standards, any NOTIS installation has the potential for linkage to other NOTIS installations, and to future regional and national databases.

"We continue our commitment to excellence," he said, "and this is evidenced by Northwestern's participation in a number of cooperative programs with the Library of Congress, such as the Name Authorities Cooperative Project."

For further information on the NOTIS library system, contact Kenton Andersen, Northwestern University Library, 1935 Sheridan Road, Evanston, IL 60201, or call Mr. Andersen at (312) 492-7004. ■■

DataPhase Acquistions Module

DataPhase Systems has announced that the Acquisitions module of the Automated Library Information System (ALIS) is now under general release to current and future users.

The chief objective of the software is to complete an integrated library system that controls bibliographic, order, and circulation information from the time materials are ordered, through cataloging, processing, public access, and circulation. Information required on any ordered material is available on any terminal in the system to an authorized user.

The module's functions encompass all acquisitions activities, from selection, through searching, ordering, claiming and canceling, receiving, routing, and fund and vendor accounting.

There are also many features unique to ALIS that provide the library with additional convenience and process control.

Examples include a complete online selection list function, which allows librarians responsible for title selections to develop and share online selection information; a cumulative order history for each item, including free-text messages, that provides any user with a past and current status report for any ordered item; a spine label production facility; and a four-tiered fund accounting tree that allows for accurate and automatic accounting of funds for almost any existing fund tree arrangement.

Since ALIS' database is built upon a full MARC record and ALIS provides an online bibliographic transfer that interfaces with all major bibliographic utilities, a complete bibliographic record for new orders can be created and a copy record established for immediate access of information. This allows patrons utilizing the online MARC catalog to perform a search, retrieve information about the status of an on-order item, and request that a hold be placed on that item.

The function was developed by DataPhase staff with input from the DataPhase Users' Group and the Acquisitions staff at the Johnson County Library in Shawnee, Kansas.

Current ALIS II users will begin implementing the module as they receive training. New users will receive it as a part of their ALIS II software implementation schedule.

More information concerning Acquisitions and a thorough description of its capabilities is available by contacting DataPhase at (816) 931-7927. ■■

USBE and UTLAS

The Universal Serials & Book Exchange, Inc. will increase access to its stock of serials by online ordering. During meetings on May 19 and 20 in Washington, D.C., USBE's board of directors accepted staff recommendations that the agency seek to become a vendor for UTLAS (University of Toronto Library Automation System).

Juanita S. Doares (The New York Public Library), USBE president, said that affiliation with UTLAS would for the first time allow USBE's Canadian members to place orders for serials online. Since USBE joined the OCLC network through CAPCON last year, online orders to USBE from libraries in the United States have soared to over 3,000 issues a month. Representatives of

USBE and UTLAS will meet in June to discuss affiliation.

Ms. Doares said that USBE's board also will explore the possibility of affiliation with other networks, such as RLIN. ■■

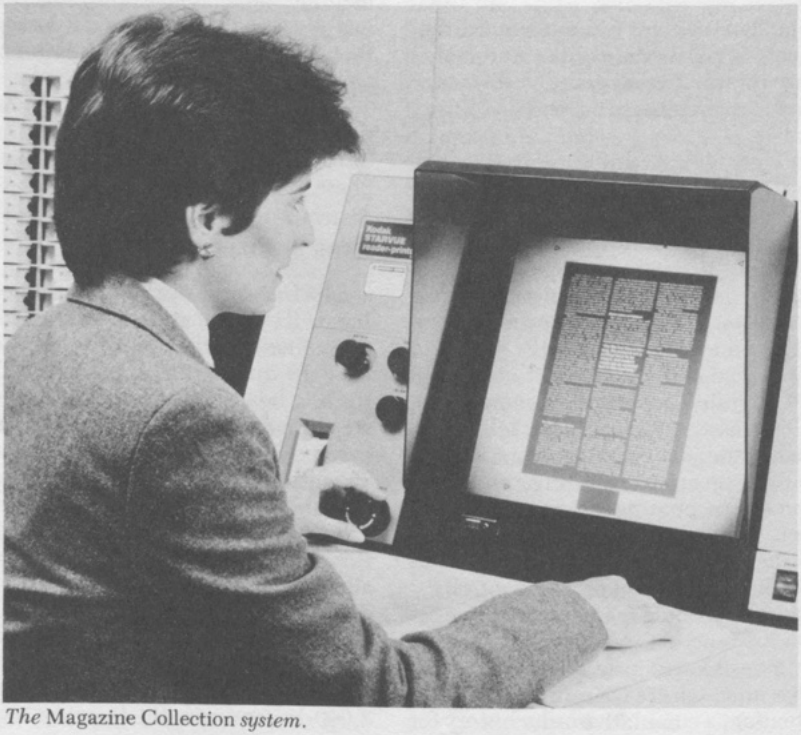
Information Access Company Introduces *Magazine Collection*

At the American Library Association Annual Conference, Information Access Company (IAC) introduced *Magazine Collection*™ which, for the first time, provides in a single system the ability to access more than 200 major periodicals, select specific articles, and make copies of the full text of the material.

Deliveries of *Magazine Collection* will begin in September 1983 with periodical coverage beginning in January 1980. Included in the initial offering will be periodicals from Condé Nast, Hearst, Billboard, Ziff-Davis, and other publishers. Publications will include *McCall's, Ladies Home Journal, U.S. News & World Report, Nation's Business, Forbes, Smithsonian, Consumer Reports, Harvard Business Review*, and more than 200 other titles. Biweekly microfilm updates will be provided by Information Access Company to offer the most timely periodical reference service available today.

To duplicate the reference aid provided by *Magazine Collection*, library patrons today refer to Information Access Company's *Magazine Index*™, select relevant bibliographies, search shelves for current periodicals, and request back copies from the librarian. Back issues are typically stored in their original paper format on microform and often require assistance from a library staff member to retrieve. A simple search on a particular subject often demands up to an hour of the library patron's time and an equal amount of staff time. An identical search, including copies of all selected materials, can be accomplished in minutes with *Magazine Collection*—without librarian assistance.

The *Magazine Collection* system is centered on a high-speed microfilm reader-printer and *Magazine Index*. The user sim-



The Magazine Collection *system.*

ply looks up a subject in the *Magazine Index* and finds citations to relevant articles. The appropriate cartridge is then selected from the library of *Magazine Collection* microfilm adjacent to the reader. The cartridge threads automatically into the reader-printer for scanning, and the selected material is copied, if desired.

At the same conference, Morris Goldstein, IAC president, demonstrated a research and development project for new reference services—a system which combines microcomputer, optical disk, and satellite technology to deliver digital data to libraries. The optical disk can contain up to one gigabyte of data—equivalent to all of the material in more than five years' of indexes to more than 2,000 magazines. From the computer terminal, the user can search for reference to specific articles in seconds. The material is displayed on the computer screen for review.

Called OSCAR (Optically Stored Computer Assisted Reference), the system can potentially receive, via a small satellite earth station, signals from a communications satellite in orbit 22,300 miles above the earth. Information transmitted by the satellite would be stored locally for reference.

Still in prototype development, OSCAR is expected to go on the market in early 1985.

For further information contact: Blodwen Tarter, (800) 227-8431 or (415) 367-7171 at IAC or Veronica Kane, (415) 966-1500, Humpal, Leftwich & Sinn. ■■

Recent Publications

Bibliographic citations were produced by María Clark, Yale University Library, New Haven, Connecticut, in accordance with the American National Standard for Bibliographic References. *New York: American National Standards Institute; 1977. 92p. (American national standards on library work and documentation; ANSI Z39.29-1977).*

Reviews

Hagler, Ronald; Simmons, Peter. ***The Bibliographic Record and Information Technology.*** Chicago: American Library Association; 1982. xx, 346p. ISBN: 0-8389-0360-3, hardcover, $25.

This book attempts to do a great deal: to provide in one short monograph an integrated review of the purpose and structure of the entire universe of bibliographic access and description and to provide the background necessary to understand the impact that computerized information systems have on that universe. It is no surprise that the effort is only partially successful. The discussion of bibliographic practice encompasses three major topics: bibliographic references in scholarly writing; abstracting and indexing; and library cataloging. The last receives the greatest attention. After a careful and well-organized review of the nature and roles of the various elements of bibliographic description, the issues involved in accessing such data are discussed in some detail, including the pros and cons of various approaches and techniques (pre- and post-coordination, authority control, filing rules, etc.). Throughout the discussion of description and access, the authors turn again and again to the role of standards and cataloging rules, and the reader is left with a clear picture of the evolution of the current rules governing library practice, and of the complex interrelationship among the various relevant standards. The presentation in this part of the book is excellent: the writing is concise and clear, the organization logical, the examples numerous and well chosen, and the authors' sophistication and depth of understanding are obvious.

The discussion of computer technology, however, is less satisfactory. The strongest element here is the presentation of the logic behind the MARC record, whose structure is shown to derive from both the data it contains and the needs of the machines which must process it. The authors unfortunately felt obliged to include yet another cursory introduction to the basics of computing (How many such discussions must the average library science student be subjected to these days?). This introduction is never related to the particulars of bibliographic processing, and it is too short to really teach much about computing. Even as an introduction to the concepts and jargon of computers the discussion is plagued by vagueness, misleading information (one comes out of the discussion of assembler language with no concept of the nature, virtues, or defects of the language), and outright errors (index files to bibliographic records and ISAM are *not* the same thing). The authors' discussion of manual cataloging displays a sophisticated understanding of the practical application and not just the theory of bibliographic control. When the book turns to computerized techniques for bibliographic processing, this understanding seems to be missing. The significant technical problems and costs associated with such techniques as storing access points only in authority files with pointers from bibliographic records are totally ignored in discussion that emphasizes the theoretical benefits of having to change only a single record when a name form changes.

Similarly, the discussion of index term truncation treats leading, middle, and trailing truncation equally, when in fact the first two involve serious technical difficulties. The uninitiated reader is likely to come away from this book with little idea of which computerized functions are readily supported today, which may be widely implemented in the near future, and which involve difficulties that will make them remain problematic for some time.

Among the major elements in automated bibliography with which librarians must concern themselves are the "bibliographic utilities" such as OCLC, RLIN, WLN, and UTLAS. These systems are among the most successful attempts to apply computer technology to bibliographic data, and they are, at least at this point, among the most potent influences on the evolution of the field. Considering their importance, it is surprising how little attention they receive in this book. What discussion there is will give the uninitiated little understanding of the utilities, and of differences between them. Here again there are occasional problems of accuracy (RLIN does not have at this point, as is claimed, either fund accounting or serials control).

Students, as well as those practitioners who have never had the advantage of a rigorous introduction to bibliographic theory and practice, can learn much from this book. Examples of writing this clear, coherent, and interesting are rare in our field. It is unfortunate that the reader seeking the equivalent introduction to computers and automated bibliography is not as well served.—*Dale Flecker, Harvard University Library, Cambridge, Massachusetts.* ■■

Matthews, Joseph R. ***Public Access to Online Catalogs: A Planning Guide for Managers.*** Weston, Conn.: Online, Inc.; c1982. ix, 345p. (An Online publication) Bibliography: p.321–30. ISBN: 0-910965-00-5, softcover, $28.50.

Online catalogs are fast becoming the automation topic of the eighties. Joe Matthews' new book well serves its stated purpose, "to present a basic primer on public access online catalogs." The book is organized into two parts: Part One is a narrative text about online catalogs; Part Two consists entirely of profiles of today's online catalogs.

Part One consists of seven short chapters dealing with primary design choices, components, search operations, effects on users, planning and implementation, and the future of the online catalog. The text is well written in nontechnical language, and numerous illustrations are included. Chapter three, "Components of Online Catalogs," and chapter four, "The Online Catalog in Operation," are particularly valuable to those beginning to plan for the new catalog. Both chapters cover major decision points facing managers in choosing and/or implementing a catalog, e.g., screen displays, terminal options, database coverage, search types, authority control, etc. Part One comprises less than one-third of the book, yet it introduces the reader to this complex new retrieval tool and provides the basic knowledge upon which to build.

The 210 pages of Part Two outline thirty-four operational online catalogs. Each profile includes summary information on the system's developmental background, computer system environment, library environment, database, system operation, user training aids, potential for system transfer, and sample screens. As stated in the preface, the profiles are based on information provided by the libraries and vendors. The methodology of collecting the data is not explained, and verification of the data is not claimed.

While the book does not claim to provide the basis for an authoritative comparison of the systems, readers might assume that the data presented is accurate and up-to-date at publication time. This assumption should not be made, because this reviewer has discovered numerous errors of fact, e.g., VTLS currently has neither keyword nor Boolean search capabilities; TLS has a series search, but does not use the BRS indexing system. Some of these discrepancies may be due to confusion about the meaning of a capability included in the profile survey document. The same capability may be present in two different online catalogs, but only claimed as present in one.

Since these confusions exist, and online catalog capabilities are implemented in a

variety of ways, readers are warned to verify for themselves any information presented in Part Two. The name and address of the institution/vendor given at the beginning of each profile is a useful starting point.

An editorial weakness of Part Two is the poor indexing. The profiles are arranged alphabetically by vendor, with the catalog "name" prominently displayed in boldface type at the top of the page. However, the catalog name is not indexed. A reader has to scan many pages to find *CITE* under the National Library of Medicine and *MELVYL* under the University of California. A minor but annoying and recurring error is the use of *work* for *word* in the word stems search feature in each profile's Systems Operations section. Despite these problems, the profiles do provide a general features comparison. The screen displays allow the reader to sample the diversity and complexity of online catalog bibliographic search and retrieval operations.

Public Access to Online Catalogs: A Planning Guide for Managers is an extremely useful managerial and informational tool giving basic instruction in online catalog literacy. As a comprehensive primer, the book complements Charles Hildreth's *Online Public Access Catalogs: The User Interface*. Matthews' book is highly recommended for those new to online catalogs.—*Denise Kaplan, Public Library of Columbus and Franklin County, Columbus, Ohio.* ■■

McCunn, Donald. ***Write, Edit, & Print: Word Processing with Personal Computers.*** San Francisco: Design Enterprises; 1982. 527p. ISBN: 0-932538-05-3, hardcover, $34.95. ISBN: 0-932538-06-1, softcover, $24.95.

Writing in a clear, concise style, McCunn presents us with an overview of microcomputer equipment, an introduction to the BASIC language, and a detailed listing of four BASIC programs that are part of a word processing system called Word Worker. The entire system will be presented in a series of three volumes of which this is the first. The entire Word Worker system will comprise eleven programs.

This volume is divided into four sections. Section one, describing equipment, suffers from the same problem that plagues any book attempting to describe equipment in an environment as volatile as today's microcomputer industry: the details are out of date. Many of the systems described, such as the TRS-80 Model I and the Apple II, have been superseded by newer models. For those models that are still available, many of the limitations discussed, such as a maximum of 16K RAM for an Atari 400, are no longer valid.

While these limitations detract from the section's usefulness as a whole, the organization of the information is good and could provide a useful model for evaluating systems in general. The subsection on computer output contains a good explanation of binary code and a chart of ASCII code.

The subsection on printers begins with a concise explanation of features one should look for, but the descriptions of specific printers are even more disappointing than the system descriptions. Not only is much of the information dated, but many of the more popular printers, such as the Epson series, are not mentioned at all.

Section two is a brief description of the BASIC language, including a subsection on various BASIC dialects. Those covered are: Applesoft, BASIC-80, and PET/CBM BASIC. Included in this section are a number of time test programs that the author feels would be useful in comparing different microcomputer systems.

Together, these first two sections make up approximately one-third of the book. While there is useful information contained in the sections, there is nothing that is not available in a number of other sources. For those who wish criteria for the selection of hardware, product descriptions, and vendor addresses, there are a number of journals in the field that contain accurate, up-to-date information. Books devoted to the BASIC language and its various dialects are also easily available and cover the subject in greater depth than is possible in this volume.

The remaining two-thirds of the book contains program listings and operating instructions for the first four of the eleven programs that will make up the entire Word Worker package. The programs included in this volume are: (1) The basic

word processor, (2) the extended writing program, (3) the extended printing program and, (4) the editing program.

The presentation of the programs is in five to fifteen statement blocks with detailed explanations following. Each statement is explained in relation to others in the routine, and the routines are grouped under functions. Those commands that differ in the various BASIC dialects are highlighted, and the reader is referred to pages where the differences are detailed and the variations listed. All in all it is a very effective method of presenting a very complex program.

Following the program listings are the operator's instructions, which detail the step-by-step operation of the programs. The format follows that of the program section. Each menu in the program is covered with examples.

These two sections are well written, easy to follow, and contain much of interest to anyone interested in developing or understanding word processors and how they work.

The last few pages of the book are appendixes that include hardware and software vendor lists, conversion tables, a summary of the program lines, a listing of the variables used in the programs, a brief glossary, and the index.

Unfortunately, despite the high quality of the writing and the excellent job the book does in describing the programs and their operation, one is left with the question, Does the world really need a word processing system written in BASIC?

With the limited usefulness of the first two sections and the doubtful need for the word processing programs, the overall utility of the book is questionable. I can only recommend it to those individuals who are hopelessly addicted to learning how to manipulate text in BASIC and to those seeking a model for how to list and explain a complex program.—*Randall L. Collver, Aubrey R. Watzek Library, Lewis and Clark College, Portland, Oregon.* ■■

Using Online Catalogs: A Nationwide Survey. New York: Neal-Schuman; 1983. c250p. ISBN: 0-918212-76-6, softcover, $24.95.

"Thought-provoking" is not a phrase that this reviewer would have expected to use to describe *Using Online Catalogs: A Nationwide Survey,* but the reader of this book comes away with a great deal to think about. Warren J. Haas summarizes this feeling in the foreword, "The results of the study point the way to the next steps. . . . Success requires an amplification of past effort and current wisdom that will challenge us all."

Using Online Catalogs is a summary of four project reports funded by the Council on Library Resources surveying the users and nonusers of online catalogs in thirty-one libraries in the United States. The editors, Joseph R. Matthews, Gary S. Lawrence, and Douglas K. Ferguson, have done an outstanding job of interpreting statistics and of presenting them in a readable manner.

The book begins, as one would expect, with an overview of the survey and descriptions of the participating libraries. From there it goes into detailed examples of the online catalogs themselves, including full sample screens from each system. These sample screens (from three to eight per sys-

Correction

The text of the lead review appearing in the June 1983 issue of *ITAL* was inadvertently printed out of order, for which we apologize. The review should have begun with the block of text running from "Quite simply . . . [page 222, column 2, paragraph 2]" through ". . . the in-house, build-your-own system is also covered [page 222, column 2, paragraph 4]." Next should have come the block of text running from "Lumped with . . . [page 222, column 1, start of review]" through ". . . not to see a description of the Ringgold system [page 222, column 2, paragraph 1]." The remainder of the review reads correctly, commencing at "According to the author's criteria . . . [page 222, column 2, paragraph 4]." We regret the error.—DLW

tem) are a strong attribute of this book, providing the reader with the capability of comparing systems and of identifying interesting features of online catalogs.

The results of the survey are presented in the second half of the report. The focus of the study was "the interaction between the human user of the online catalog terminal and the online system which supports and responds to the user's request for information." To this end, the factors affecting catalog use are grouped into broad categories: "the user, the task, the organizational interface (the library), the online system, the database, and the human-online interface." The editors identify and analyze specific features of the online catalogs within these broad categories. They explicitly warn against identifying the features as desirable or undesirable, stating that their intention is "to introduce the notion of design trade-offs into the discussion of online catalog development."

The editors close with their interpretation of the findings. They present this as an assessment of the implications for four distinct groups: library managers, library reference staffs, system designers, and the library profession. At this point the reader must take over and begin to think about the implications for his/her library. As a starting point, as a focus of current thought, or as a reference work, this book is absolutely essential to anyone involved in the design, selection, or implementation of an online catalog.—*Alan E. Hagyard, Yale University Library, New Haven, Connecticut.*■■

Other Recent Receipts

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

Bagley, D. E.; Oyston, E. *Automation in a Polytechnic Library: Fifteen Years' Development at Hatfield.* London: The Library Association; c1982. iv, 77p. (Case studies in library automation) Distributed in the U.S. by the Oryx Press, 2214 North Central, Phoenix, AZ 85004. ISBN: 0-85365-964-8, softcover, $21.

Byerly, Greg. *Online Searching: A Dictionary and Bibliographic Guide.* Littleton, Colo.: Libraries Unlimited; 1983. 288p. Includes indexes. ISBN: 0-87287-381-1, hardcover, $27.50 (U.S.), $33.00 (elsewhere).

Carter, Ruth C.; Bruntjen, Scott. *Data Conversion.* White Plains, N.Y., London: Knowledge Industry Publications; c1983. iii, 169p. (Professional librarian series) Bibliography: p.161–66. ISBN: 0-86729-047-1, hardcover, $34.50. ISBN: 0-86729-046-3, softcover, $27.50.

Communications and the Future: Prospects, Promises, and Problems. Howard F. Didsbury, ed. Bethesda, Md.: World Future Society; c1982. vii, 357p. Includes bibliographical references. ISBN: 0-930242-16-5, softcover, $14.50.

Council on Library Resources. Committee on Production Guidelines for Book Longevity. *Book Longevity.* Washington, D.C.: Council on Library Resources; c1982. 19p. "Reprinted from the May 29, 1981, and July 2, 1982, issues of Publishers' Weekly."

The Development of National Library and Information Services: Papers Given at the First Library Association International Workshop, London, 1981. Edward Dudley, ed. London: The Library Association; c1983. xii, 202p. Includes bibliographical references. Distributed in the U.S. by the Oryx Press, 2214 North Central, Phoenix, AZ 85004. ISBN: 0-85365-784-X, softcover, $27.50.

Dougherty, Richard M.; Heinritz, Fred J. *Scientific Management of Library Operations.* 2d ed. Metuchen, N.J.: Scarecrow Press; 1982. ix, 274p. Includes bibliographies and index. ISBN: 0-8108-1485-4, hardcover, $15.

Future of Library Networks. Ahmed H. Helal; Joachim W. Weiss, eds. Essen Symposium; 1981 September 16–18. Essen, West Germany: Gesamthochschulbibliothek; 1982. 259p. (Veröffentlichungen der Gesamthochschulbibliothek Essen, ISSN 0721-0469 ; 4) ISBN: 3-922602-04-5.

Increasing Productivity through Library Automation. Ahmed H. Helal; Joachim W. Weiss, eds. Essen Symposium; 1982 October 11–14. Essen, West Germany: Gesamthochschulbibliothek; 1983. 288p. (Veröffentlichungen der Gesamthochschulbibliothek Essen, ISSN 0721-0469 ; 5) Includes bibliographical references. ISBN: 3-922602-06-1.

Lilley, Dorothy B.; Badough, Rose Marie. *Library and Information Science: A Guide to Information Sources.* Detroit, Michigan: Gale Research Company; c1982. xvi, 151p. (Books, publishing, and libraries information guide series ; V.5) (Gale information guide library) Includes indexes. ISBN: 0-8103-1501-7, hardcover, $38.

Online Catalogs: Requirements, Characteristics and Costs. Davis B. McCarn, ed. Report of a conference sponsored by the Council on Library

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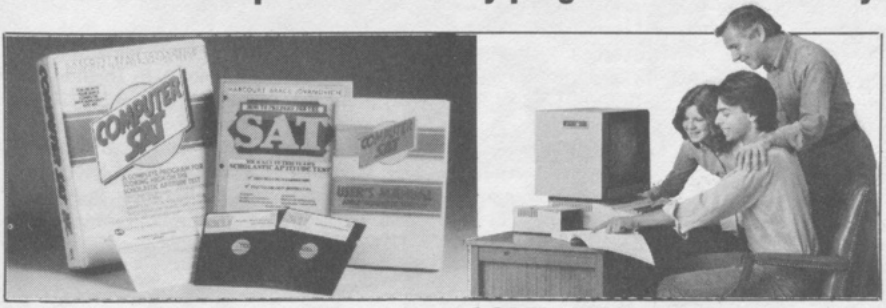

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Resources; 1982 December 14–16; Aspen Institute, Wye Plantation, Queenstown, Maryland. Washington, D.C.: Council on Library Resources; 1983. Softcover, $10, prepaid only.

Plaister, Jean M. *Computing in LASER*: Regional Library Co-operation* (*London and South Eastern Library Region). London: The Library Association; c1982. 55p. (Case studies in library automation) Distributed in the U.S. by the Oryx Press, 2214 North Central, Phoenix, AZ 85004. ISBN: 0-85365-954-0, softcover, $15.

Spivack, Jane F. *Careers in Information.* White Plains, N.Y., London: Knowledge Industry Publications; c1982. iv, 250p. (Professional librarian series) Bibliography: p.240–46. ISBN: 0-914236-83-0, softcover, $27.50. ISBN: 0-914236-70-9, hardcover, $34.50.

Stevens, Norman D.; Stevens, Nora B. *Author's Guide to Journals in Library & Information Science.* New York: Haworth Press; c1982. 183p. (Author's guide to journals series) Includes bibliography and index. ISBN: 0-917724-13-5, hardcover, $19.95.

Stibic, V. *Tools of the Mind: Techniques and Methods for Intellectual Work.* Amsterdam, New York: North-Holland Publishing Company; 1982. xiii, 297p. Includes bibliography and index. Available in the U.S. and Canada from Elsevier Science Publishing Co., 52 Vanderbilt Ave., New York, NY 10017. ISBN: 0-444-86444-X, hardcover, US $35 (U.S. and Canada), Dfl 85.00 (elsewhere).

Subject Access. Keith W. Russell, ed. Report of a meeting sponsored by the Council on Library Resources; 1982 June 7–9; Dublin, Ohio. Washington, D.C.: Council on Library Resources; 1982. ix, 80, [16]p. Softcover, $10, prepaid only.

Terminologies for the Eighties: With a Special Section: 10 Years of Infoterm. Wolfgang Nedobity, ed. Munchen, New York: K. G. Saur; 1982. 412p. (Infoterm series ; 7) Includes bibliographical references. Distributed in the Western Hemisphere by Gale Research Company, Book Tower, Detroit, MI 48226. ISBN: 3-598-21367-0, softcover, $55.

Video to Online: Reference Services and the New Technology. Bill Katz and Ruth A. Fraley, eds. New York: Haworth Press; c1983. 205p. (Reference librarian ; no. 5–6) Includes bibliographical references. ISBN: 0-86656-202-6, hardcover, $14.95.

Videodisc/Microcomputer Courseware Design. Michael L. DeBloois, ed. Englewood Cliffs, N.J.: Educational Technology Publications; 1982. xv, 178p. Includes bibliographies. ISBN: 0-87778-183-4, hardcover, $24.95. ■■

Letters

LC MARC Copyright Questioned

Editor's Note: The ITAL *editor was sent a copy of the following letter, which was written to Peter Young, Customer Services Officer, CDS, Library of Congress. Copies were also sent to the Dean of Library Affairs, University of Petroleum & Minerals, and Alberic Regent, DOBIS/LIBIS Users Group.*

Dear Mr. Young:

We received our renewal notice for LC MDS tapes recently, and with it came a very disturbing "Customer Agreement" that introduces a prohibition for "copying and re-distribution of LC MARC tapes in the form received by the MDS Subscriber." We are not engaged in re-distribution of tapes or individual MARC records, and have no plans to do so. However, I am alarmed at this restriction on the dissemination of uncopyrighted information, which has been offered to all comers without restriction for many years.

Due to the costs of MARC subscriptions, we have steadily cut back over the past three years, until UPM Library is now a subscriber only to the LC MDS Books (English) service. I have, in the past, speculated on the desirability of Saudi university libraries subscribing cooperatively to different parts of LC MDS, and then exchanging tapes as a means to have available more varied records without undesirable duplication of expense. This appears out of the question under this new policy.

I would also like to inquire if this new policy in any way restricts the activities of secondary vendors of MARC records, such as BNA and Carrollton Press. Specifically, I am concerned about the wording of section II.A. of the Customer Agreement:

> The customer may copy or redistribute/on a record by record basis to another party only those MARC records which have been modified or otherwise claimed for local cataloging use.

What constitutes "modified"? Does entry to a vendor data base and subsequent redistribution as a "Blackwell" or "Carrollton" record meet this requirement, or does the record have to go through editorial changes? For DOBIS users, would translation to MARC and re-distribution in that format be permitted? What constitutes "local cataloging use?" Would this restriction have any impact on a customer of a vendor, such as BNA, if the customer wished to set up a subject profile for selected MARC records?—*Selden S. Deemer, Library Analyst, Library, University of Petroleum & Minerals, Dhahran, Saudi Arabia.*

Subject Approach Important for Maps

To the Editor:

This morning at breakfast I was hastily zipping through the March issue of your venerable mag and decided to comment on a couple of things.

Pauline Cochrane's charge may be true with book librarians, but in the special format materials, we have always been thematic oriented. With maps, the great debate—until automation made it meaningless—was defending area main entry. Very important when you realize most map collections could only afford one card per map. Our control has always been primarily intellectual before bibliographic; do we have a map of a place rather than this specific map of a place. Most of us opted for "area-subject" cards, "Pennsylvania-canals-1928" or "Pennsylvania-Coal-1945." Because maps can show many things, we slip in relevant cards for the other subjects or areas (insets) on the map when we have the time. With automation,

map cataloging will be prepared to deal with the broad subject approach asked for by Cochrane because we have lived with knowing this is what our users want and need for many years. Map folk even have fields for coordinates, waiting for the day we can search on them. We will be prepared!

Going along with this is the article by Nancy Carter on the music catalog. This is the kind of approach special formats have always taken (if the librarian is any good, that is). Here we have librarians embracing a technology and using it to serve their own ends (and the interests of their users).—*J. B. Post, Map Librarian, Free Library of Philadelphia, Philadelphia, Pennsylvania.*

Profile Software Package

To the Editor:

Nancy F. Carter, in her "Sheet Music Index on a Microcomputer" (March 1983, p. 53), shared with the library world a model application of the TRS program, "Profile." However, those considering emulating her indexing should not be discouraged by what Miss Carter considered "drawbacks." "Profile" does not limit an alphabet to one disk. We prepared 1,500 records of hardware inventory and can obtain from three disks of data a single alphabetic arrangement for our titles, a single chronological list, a single alpha/numeric list of identification numbers, a single alphabetical list of vendors, and more.

It appears that Miss Carter used only one of the potential four segments in assigning fields. One more segment would have provided more than enough room for comments.

Since we built our inventory, we have upgraded the "Profile" system with "Profile Plus" and "Prosort." The potential offered by this upgrade is tremendous. We are running a budget, reporting hardware utilization, recording data about on-line search services, and numerous other sundry reports.

Perhaps the "drawbacks" attributed to "Profile" were real, but the limitation seems to be the number of disk drives utilized rather than a defect of "Profile."—*Sister M. Constance Melvin, I.H.M., Executive Director, Learning Resources Center, Marywood College, Scranton, Pennsylvania.*

Old Systems

To the Editor:

After reading your request for information on pioneer automated library systems, I would be remiss not to report on the University of California, San Diego automated serials holdings system. Our beginnings date back to 1961 when Melvin J. Voigt, then UCSD University Librarian, and Clay Perry, Jr., Director of the UCSD Computer Center, began paving the way for our current system. By mid-1962, there were 712 records in the master file. In April 1964 the programs which were the basis of the current system became operational, monthly updates have occurred without exception since that time, and the file now contains over 50,000 records.

The system, which began on a CDC 1604 and was later run on a CDC 3600 and an RCA Spectra 70 Model 45, has been operating on Burroughs mainframes since May 1971. The current B7805 was installed in August 1979.

The serials system is a batch system though IBM card files have been replaced by direct input via computer terminals. The basic programs are in COBOL with a few auxiliary ones in PL/I and ALGOL.

From the master file of serial holdings, a large variety of lists are produced on paper and microfiche for public and staff use. These include expected arrivals lists, bindery lists, claims lists, keyword lists, shelflists, vendor lists, individual branch holdings lists, etc.

While we continue to refine and enhance current programs, eventually the entire system will be subsumed by a total on-line inventory/circulation system in which holdings will be recorded.

A more complete description of the system is available in an article by me entitled: "The University of California, San Diego, Automated Serials System, 1980" published in *The Management of Serials Automation: Current Technology and Strate-*

gies for Future Planning edited by Peter Gellatly (1982).—*Roberta A. Corbin, Systems Analyst, University Library, University of California, San Diego.*

To the Editor:

Your note in the current issue of *ITAL* about old systems caught my eye and made me think about how long our systems have been running. I came here over 20 years ago, and the first program I wrote was for a union list of serials on the 1401. It was rewritten for the 360 in PL-1 (pre-release version!) because the 1401 vanished out the door, but it still retains the same structure and continues serving us today.

Our programs to produce many of the products involved in processing scientific and technical reports for the library also have been around for at least 18 years. Our programs for journal renewal date in structure and function to the 1401, but have been rewritten for the 360 and had some additions. We finally made a minor change in the format of the printed purchase orders the other day after about 17 years.

Our catalog card production programs were written about 15 years ago in prerelease PL-1 for the 360, 32K DOS computer. Although it now runs on a 3033 under MVS, it is still the same program (really!) as I was surprised to note when I had to look at it again last week. It was the first card production program which would go ahead and print card 2+ automatically. It had a floating left margin (conditioned on the width of the call number), and formatted the tracing block around the rod hole if that's what it took to keep from overflowing to the next card.

I suspect that the Idaho National Energy Laboratory library may still have some of my old programs running there, but they, too, would have been re-written from the 4k card 1401 on which they first ran. You should have a story on the 1401 sometime, for it was what really made library automation possible.—*Hillis L. Griffin, Director, Technical Information Services Department, Argonne National Laboratory, Argonne, Illinois.*

To the Editor:

The oldest living library automation system? It is Morris Library, SIUC, which went operational May 1963 with IBM 357. We upgraded to IBM System/7, which is still healthy, mid-June 1976.—*Sidney Matthews, Assistant Director, Morris Library, Southern Illinois University at Carbondale.*

Editor's Note: The Morris Library's automated circulation system is described in: Sidney E. Matthews, "From a 357 to a System/7" in LJ Special Report #4: Buying New Technology, *New York, Library Journal, 1979, p.20–25.* ■■

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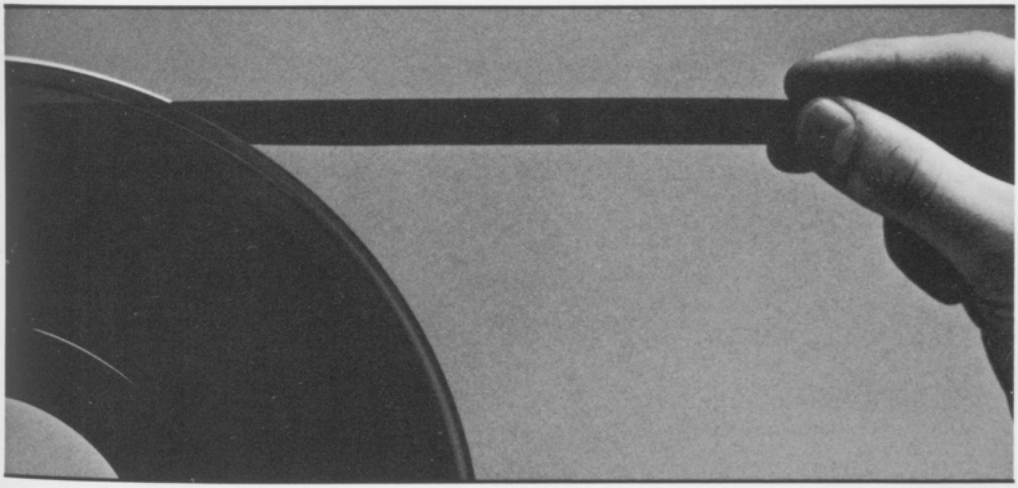

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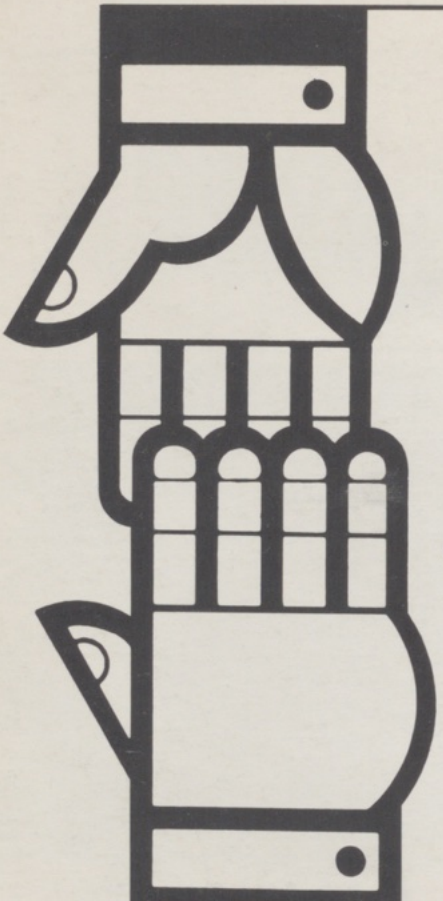

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