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Too Much, and Yet Too Little

When we take formal courses in systems analysis, business administration, or research design, we learn that redundancy has positive aspects. If several people attempt to reach the same goal in different ways, the chances are good that one will succeed and that we will learn from the mistakes of the others. Likewise, when a researcher performs the same experiment several times, the chances of success will be increased, and the knowledge gained will be considerably more than would be the case had the experiment occurred only once.

However, in the arduous process of designing and developing a National Bibliographic Network, it seems as of March 1977 that too many groups have their oars in motion, and simultaneously no one knows where the boat is moving—if anywhere.

Who is "involved" in the National Bibliographic Network (NBN)? In alphabetic order, I have identified *at least* the American Library Association (which is attempting to determine the proper locus within the organization for intertype library activities), the Association of Research Libraries, the Council of Computerized Library Networks, the Council on Library Resources, the Library of Congress, the National Commission on Libraries and Information Science, the National Federation of Abstracting and Indexing Services, a "Networks Advisory Group" (linked with the Library of Congress), and the Ohio College Library Center (not striking out immediately to form its own official NBN, but studying its role in relation to the prospective NBN). In addition, the National Bureau of Standards and ANSI Z39 committees are apparently also involved.

This much involvement may be wonderful. Within the alphabet soup listed above, there is certainly enough brainpower and expertise to design and build an NBN. But *what is happening?* Do *you* know?

One is reminded of circumstances almost four years ago which prompted a *JOLA* editorial entitled, "Who Will Steer the Ship?" (At that time, groups were in the process of designing the CONSER project and investigating a standard minimum MARC format; it seemed then that, while many were involved in this process, the library world would be presented with a *fait accompli,* without an opportunity to react and provide feedback to the designers.) Whether knowingly or unwittingly, it is easy for those with authority or funds to guide us in specific directions without adequately informing us what is being done or how it will affect us. While participatory decision making has its limits, it is necessary to play the political game to derive support for a proposed system—and this game requires *communication.*

Those of you who are NBN-watchers should now ask yourselves two questions: (1) who is involved in the creation of an NBN? and (2) what do you really know about the proposed plans for an NBN? If you are con-

fused by and dissatisfied with the answers, as I am, you may wish to join me in seeking out explanations from those who are NBNers, and in expressing to them *your* opinion about a valid organization, governance, and system function of an NBN. Let us attempt to curb the redundancy of NBN efforts in our various professional organizations, and at the same time increase the information flow to and from the chief designers of the system.

Although the multitude of professional societies certainly have valid interests in the creation of an NBN, specific leadership roles must be taken by a very few institutions in order to maximize the design and development process. Let us—the profession—assign to LC or NCLIS or ALA the coordinating role required to bring together the specifications for all affected parties. And let us insist that we be consulted and informed, through the LC *Information Bulletin, JOLA,* and other publications, so that the result will be the most acceptable system to the greatest number of institutions.

SUSAN K. MARTIN

Telecommunication in Library Networks: A Five-Year Projection*

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In this article, the computer, library network, and telecommunications industries are examined and the state of the art briefly summarized. Several models for library network design are presented, with evaluations of the effectiveness of each model and recommendations for future action.

INTRODUCTION

During the past decade numerous computer and data communication networks have developed throughout the country. Some of these are commercial ventures aimed at providing general computing services; others are government-funded networks with the dual aims of providing service to educational or governmental agencies and of developing prototype network designs. A few of these networks have been developed with the purpose of providing some facet of service to libraries. The emphasis in this article will be on the role of telecommunications in these emerging library networks.

Evidence to date indicates that the telecommunications costs for library service networks comprise a substantial portion of the operating expenses. Thus in the development of a network, efficient use of available telecommunications technology can have a major impact on the operation and economics of the network. It is our purpose in this paper to examine the impact of telecommunications on library networking, and to project a reasonable evolution of library networks over the next five years, pointing out some of the factors in future designs that must be considered by formulators of policy and planners of networks. Specifically, we intend to assess the present importance of telecommunications for library information processing networks; to project the growth and structure of regional and national library networks; to assess the role of telecommunications in fu-

* This research study was partially supported with funds from the Southwestern Libraries Interstate Cooperative Endeavor (SLICE) Project.

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ture library network growth; and to stress the importance of developing guidelines for the rational growth and development of library information networks.

During the course of this study we interviewed fifteen people at various levels of involvement in library networks. Their feelings for present operations and their sense of future direction are reflected in our conclusions.

ASSUMPTIONS

Based on the current state of information networks, it is reasonable to make several assumptions.

During the coming five years, computers will be used increasingly for library staff functions. A recent study identifies eleven staff functions that lend themselves nicely to computerization since they involve the handling of massive data files or simple, easily programmed manipulations of the data.[1] Primary among these projected applications are two that are already available to a large number of customers: production of catalog cards, and serials control. Also on this list we may include control of archival material, book purchasing, circulation control, production of indexes, information retrieval, inventory, overdue notification, records, and computerized registration. Many of these latter applications are currently being computerized on a local basis and by a number of the intrastate networks identified in the Westat report.[2]

While the cost effectiveness of computerization on a network scale has yet to be established for these functions, there seems to be no doubt that the increasing volume of information resources and the decreasing cost of computer and telecommunication equipment and services will drive a library network system to the point of being cost effective well within the next five years.

Effective computer use within a library will be largely based on the processing of terminal-originated transactions, with a shared data file handled at a service center remote from the local library. Under its current acquisitions policy, the Library of Congress obtains approximately three-fourths of the titles being added to large research libraries, and a substantial portion of the titles cataloged by other libraries.[3] Thus the LC acquisitions form a shared data file that many libraries have reason to access. More than 45 percent of these data are currently available to other libraries through the MARC magnetic tapes that the Library of Congress produces. The MARC tapes provide about one-third or more of the input to operational shared cataloging systems, the remainder being entered directly by the user libraries.

There is a potential for economies of scale based on the use of a common data base for large groups of libraries. The individuals interviewed generally agree that the quality and consistency of the MARC records are sufficiently high for these to form the core of such a data base. Neverthe-

less, for some purposes records locally produced and entered into the data base are useful to other librarians. The librarians at north Texas schools with whom we talked stated that in their experience with a data base containing both MARC and locally produced records, 80 percent or more of the records needed for their card production operations were available. Furthermore, these librarians quickly learned to identify the most reliable sources for locally produced records.

Since much of the file manipulation in library work involves the handling (storage, searching, updating, retrieval) of individual records as opposed to the *en masse* moving of large subfiles, these applications are well suited to the use of interactive terminals, featuring CRTs and optional hard-copy capabilities, communicating with the central computer over voice-grade lines.

There is a need for service functions to satisfy identifiable multistate regional interests. Historically, groups of people within neighboring states have banded together to discuss common problems and interests. This has occurred in many fields of interest, including library and information science. The Westat report, for example, cites seven regional library associations, thirteen multistate library consortia, twenty-three regional library cooperatives, and more than one hundred intrastate cooperative efforts that currently exist or are planned. This is a clear indication of the feeling among librarians that, whether because of ease of travel, commonality of interests, or other reasons, there is a need for librarians within a relatively small region to cooperate, largely in a manner that is designed to meet their own regional needs. In any library network design, the regional organizations should play an important role in identifying the perceived needs, and in providing some of the service functions necessary to meet these needs.

The stage is being set for rapid growth of information networks. The technology necessary for regional and national information networks is currently available, with much of it in active use for commercially profitable computer networks. While current economics may place some of this technology out of the reach of libraries, the short-range economic structure is rapidly evolving in a manner that makes information networks increasingly feasible and attractive. Further, there has been enough discussion of the network concept, and enough experimentation with the provision of network services, that the implementation of such networks is readily accepted by the users.

A planning horizon of five years is reasonable and appropriate for this study. Projections relating to computing, especially long-term projections, have historically been notoriously unreliable when compared to reality. This article will concentrate on the known technologies and applications that can readily be included in the expansion of library networks. Even with this limitation, long-term projections are unreliable because of the influence of nontechnical factors such as customer acceptance of services

and the general economy. Thus we face the task of choosing a planning horizon that is reasonably short, to improve accuracy, yet long enough that it extends beyond projects that are currently under development. The five-year horizon fits these criteria well, especially since there are many examples of new technology that will be available within this horizon—mini- and microcomputers, digital telecommunications, packet switching, satellite communications—and many library applications that are currently being tested, as we have indicated above. These developments will be discussed later in this report.

The development of a library information network brings together the technologies of computers and telecommunications on the one hand, and the needs and practices of the libraries on the other. To provide a base for projections of network development, we must examine the current interaction of these three disciplines.

CURRENT DEVELOPMENT OF LIBRARY NETWORKS

In order for an individual library to make effective use of the variety of services that may be available over a library network, it is important that these services be based on compatible data files. Compatibility of data files can be provided by the MARC tapes supplied by the Library of Congress, and by the use of MARC formats in generating other records for a data file. Although condensed records as used by some service centers have certain advantages, they can impact the compatibility of data files, as different groups choose different condensations. The resolution of this situation could be either the adoption of a common standard for condensation, or the implementation of automatic procedures for relating a condensed record to the corresponding full record.

Perhaps the most successful service group is the Ohio College Library Center (OCLC), which provides a service based on the production of catalog cards to more than 800 participating libraries.

The primary service performed by OCLC consists of on-line cataloging and off-line catalog card production, based on MARC tapes modified to suit users' needs.[4, 5] The OCLC data base consists of over two-and-a-half million holdings records, approximately one-fourth of which are from the MARC tapes. It is growing in excess of 15,000 records per week. To provide this service required innovation in both terminal design and computer software.

The BALLOTS (Bibliographic Automation of Large Library Operations using a Time-sharing System) center at Stanford University has approached library networking from a different direction.[6] Instead of providing a rather limited service to a large number of libraries, as OCLC has, BALLOTS has aimed at providing broad services to a single university library and its users. The BALLOTS data base consists of approximately 600,000 records, roughly one-third of which are from modified MARC tapes. It is growing at a rate of 3,000–4,000 records per week. BALLOTS

is now extending its services to libraries throughout California, and exploring extensions on a national and international scale. Thus both BALLOTS and OCLC are nationally oriented networking services aimed at the same goal of broad services to a large number of libraries.

In addition to these networks, several other efforts are under way that probably will grow into regional or even national networks.[7] We mention, for example, the Washington Library Network, based at the Washington State Library.[8] More than twenty regional networks are currently under development, either independently or allied with one or more of the national efforts. The objective of many of these networks is not, in contrast to that of OCLC and BALLOTS, to provide a marketable library data base service. Rather, these networks develop as user groups with the objective of providing better access to available services for the member libraries. For example, the New England Library Network (NELINET), the Southeastern Library Network (SOLINET), and the AMIGOS network serving the states in the Southwest presently rely solely on OCLC to provide service to their customers.

The AMIGOS network is a typical example of a developing regional library network. The present network was proposed by a consortium of fourteen colleges and universities in north Texas. These institutions were joined by other academic libraries, public libraries, and the Texas State Library to form the nucleus of AMIGOS. Within a three-year period this network has grown from a conception to a viable organization serving seventy-eight library sites in six states, with more than 160 terminals.

The original network as of 1974 consisted of thirty-two terminals for the twenty-four libraries, connected by a dedicated, voice-grade telephone line to the OCLC center in Columbus. The terminals used were sophisticated and relatively expensive since they involved a certain amount of memory and logical processing capability. They have proven satisfactory and are still in use. The memory buffer is of sufficient size that at least one full catalog card record may be held at the terminal for editing before it is transmitted to the central computer. The terminal logic appends control information to any record being transmitted, and identifies and captures incoming records on the basis of their associated control information. This design has the advantage that a terminal ties up the telecommunication line only while transmitting a buffer load of data. Hence it is possible to attach a relatively large number of terminals to a given line without degrading effective use of any one terminal. However, the expense of each terminal is a deterrent to their widespread adoption. In addition, since there is no guarantee that another network will opt for the same type of terminal design, the use of these terminals may inhibit use of alternative network services.* However, it is reassuring to note that the data are trans-

* For example, the terminals used by BALLOTS are of different manufacture, have twice as much associated memory, and logic programmed to serve the functions and formats of that particular system.

mitted in ASCII, an eight-level code for data transfer adopted by the American National Standards Institute to achieve compatibility between data devices.

Presently AMIGOS serves its seventy-eight libraries within five dedicated voice-grade lines from Amarillo (serving New Mexico and Arizona), Waco, Dallas, Huntsville (serving southeast Texas), and Little Rock to Columbus.

The next stage of development for AMIGOS has been approved and should be implemented before the summer of 1977. It calls for replacing the five lines to Columbus with two 9,600-baud trunk lines, one from Oklahoma City and the other from Dallas. Multiplexers at these two sites will be used to integrate traffic from voice-grade terminal lines into eight dedicated 2,400-baud channels.

COMPUTER INDUSTRY

The second industry to be considered is the computer industry. Developments in this area have been fairly conservative in recent years, being mainly a refinement of prior concepts, without major surprises or shifts in direction. Nevertheless, it is evident to one who examines the industry that several trends and developments strongly impact the shaping of library and information networks. The major influences here result from the sharp miniaturization of computers and the orders-of-magnitude increase in data handling capabilities.

For much of the past decade there has been an increasing emphasis on the use of remote terminals as input and output devices for computers. Much of this work has been related to systems involving terminals that are locally remote, and may be "hard-wired" to the computer, or attached via local telephone lines. The natural extension of this work has been to allow access to the computer from distant terminals via long-distance lines. Achievement of this access was no simple feat, but involved the development of high-speed modems and conditioned telephone lines, as well as solution of the organizational problems of interfacing a user, a computer service supplier, and often more than one telephone company. Solution of these problems ultimately led to the development of commercially viable nationwide data processing networks. Examples of such services offered by private firms include the MARK III network of General Electric, Control Data Corporation's CYBERNET service, and the network of Tymshare, Inc. These networks and others provide computing service to a large region, the entire nation, or even internationally.

The development of not-for-profit academically oriented networks has faced a different set of problems, including that of financing such a venture. The federal government, over the past decade, has financed a number of regional network developments, thus enabling them to concentrate on solving the major problems such as technical difficulties and chauvinism that have threatened their existence. Examples of these networks include:

Dartmouth—serving Dartmouth College, high schools, and other colleges in New England;

MERIT—serving the University of Michigan, Michigan State University, and Wayne State University, plus a few smaller colleges in Michigan; and

TUCC—serving colleges and universities throughout North Carolina.

These are among more than twenty-five regional computer networks supported initially by the National Science Foundation.[9] The focus of these networks has been to provide computing resources for colleges and universities, and, to some extent, for high schools. These networks have had neither the ability to set commercial rates for profitability nor the massive funding that is associated with major scientific research efforts. Thus, once started, they have had to rely heavily on their own internal momentum for continued survival. In this effort, some of the networks have been highly successful and others have failed. Failure has been primarily due to organizational difficulties rather than to technical problems.

The present state of development is such that any regional data processing service, even a not-for-profit one, can reasonably consider expansion to a national market. There are no technical obstacles to such an expansion, although any effort in this direction may well run into organizational, financial, or market-acceptance difficulties.

Increased reliance on advanced solid-state technology in the design of computers and terminals is playing a key role in the development of network information processing capabilities. This technology has produced machines of unprecedented reliability, with accompanying dramatic decreases in physical size and increases in speed. The development of inexpensive, sophisticated mini- and microcomputers has been a direct result of achievements in solid-state technology.

Minicomputers are physically small general-purpose computers, with capabilities comparable to those of the large commercially available computers of a decade ago. The IBM System/3 and the Digital Equipment Corporation's PDP-8 and PDP-11 are among the best known of the minicomputers. Such a computer can be readily interposed between computer terminals on one side, and larger computers or digital networks on the other, performing vital connection and switching functions. In addition a minicomputer has the capability to perform simple logic and editing functions on the data before they are entered into the network, and to identify terminal users and monitor their use.

The current end-product of computer miniaturization is the microprocessor, whose entire logic circuitry resides on one or a few semiconductor chips. Currently most evident in the guise of hand-held calculators, these microprocessors are fast becoming components in much of consumer technology. They are featured as control elements in television sets, microwave ovens, and automobile ignition systems, and will shortly appear in a host of other products. Obviously, such ultraminiature computers, with

increased memory and processing functions, could be placed within the framework of present terminal devices. Thus it is entirely practical to expect terminals in the near future to be increasingly "intelligent," and to be capable of taking over many of the functions currently relegated to minicomputers or to the central network computer.

A second aspect of the microprocessor development is the home computer. Reasonably sophisticated computer kits are available for little more than the cost of a color television set, and sales of these have been so rapid over the past eighteen months that there are no accurate figures on the number of working computers in private hands. In addition, the handheld calculators are evolving into pluggable data entry units that can be used alone or attached to a larger computer system as terminals. It is clear that once the initial "fun and games" period of use of these devices is over, information processing—including access to a library information network—will be a prime function.

A dramatically increasing capability to handle data is also about to impact the information industry. Within the past few months, printers have been announced that will produce more than 13,000 lines of print per minute. Data transmission devices are now capable of capacities up to 280 million bits of information per second—enough to keep 1,000 of the new printers going. In library terms, such data transmission rates are sufficient to handle the text of roughly 400,000 books per day.

The above developments are primarily direct extensions of current technology and theory. Other, more exotic, developments are also occurring within the computing industry. Primary among these are the development of ultra-mass storage and of unorthodox machine architectures. Presently available high-speed computer memories rely heavily on magnetically based solid-state devices for the storage of data. Other storage media are conceivable, and several types are under development, including photographic storage devices, laser and holography techniques, and even experimentation with biologically derived storage devices. Such experiments have resulted in operating devices capable of storing 1 trillion bits of information—roughly equivalent to 10,000 400-page books, or 16 million catalog cards.

Aside from improvements in size and speed, the basic architecture of most commercially available computers today remains essentially the same as it has been for more than twenty years, based on concepts put forth by John von Neumann in the 1940s. In recent years, however, alternative computer architectures based on essentially different principles have been studied. These include the development of computers that handle parallel data streams, and of computers that operate "associatively," that is, locating data directly by name or properties, rather than by the specific machine addresses at which the data are stored.

Neither ultra-mass storage nor alternative architectures have had much impact on currently available computers. However, taken in combination with microprocessors and high-volume data handling capabilities, they

clearly will force a change in our approach to public information. The development of information networks for the use of librarians and library patrons alike will become a prime aspect of the information industry.

TELECOMMUNICATIONS INDUSTRY

The final and most important industry for us to consider is the telecommunications industry. Here, as in computers, there have been many new developments within the past few years. The efficiency of transmission cables has been improved; microwave data transmission facilities have been designed and constructed; and successful telemetry and transmission techniques from the space program have been adapted to public use in the form of communications satellites having data transmission capabilities.

In contrast to the computer industry, telecommunications is heavily regulated by the Federal Communications Commission (FCC) and state utility commissions. The interaction between technical developments and government regulations shapes the telecommunication choices available to network planners.

Development of remote computing has been based largely on the use of commercially available telephone lines for data transmission. This technique requires the use of modems to convert between the digital data that the computers use and the analog signals that the transmission lines are designed to handle. In the early stages of this development, AT&T supplied low-speed modems to users, and resisted strongly the introduction of higher-speed devices from other vendors. However, in recent years, and at least partially as a result of various FCC and court decisions, high-speed devices have been readily available, and AT&T has joined in the competition to supply these to customers.

The introduction of increasingly higher speed attachments has had a direct and beneficial impact on the quality of data transmission lines. Ordinary voice-grade lines have been supplemented with transmission lines having various degrees of "conditioning," to assure greater reliability for high-speed data transmission.

The original attitude of AT&T and the other telephone utilities can be attributed largely to the inertia of more than a quarter-century of supplying telephone service under protective regulations, and to a view that data transmission was but a very small fraction of their total business. In the 1960s the FCC recognized that a new technological environment had developed, largely from missile and space technologies, and that there was an increased diversity in the market that the telecommunications industry must serve. In a series of historic decisions the FCC totally reversed earlier policies that treated telecommunications as a "natural monopoly," and opened the field to innovation and competition. The *Carterfone* decision, in 1968,

> scrapped as totally unlawful the traditional ban within the telephone industry against customers interconnecting terminal devices and systems to the telephone network when those equipments are not supplied by or rented from the telephone carriers themselves.[10]

This decision directly affected the manufacture and use of modems, terminals, and minicomputers for line concentration and switching.

> Another major response by the Commission was the formulation in 1971 of a policy permitting and encouraging the entry of new carriers seeking to serve the emerging markets and existing but latent submarkets for intercity specialized communications services.[11]

This decision allowed the development of private telecommunications utilities, dedicated to digital data transmission and other specialized communication needs. MCI is one of the companies that arose because of this decision, starting with a microwave link between Chicago and St. Louis for both data and voice transmission. MCI now has microwave links from the East Coast through Chicago, St. Louis, Dallas, and Houston, and an agreement with a common carrier to serve the West Coast. They currently serve 6,000 customers. Another company for which this decision paved the way was Datran, using microwave transmission strictly for digital data. Datran hoped to provide an economically attractive digital transmission service, but was forced into bankruptcy by marketing and industry pressures, leaving debts of more than $100 million. Blaming the demise of Datran on unfair practices by AT&T, the parent Wyly Corporation has instituted a $285 million anti-trust suit against this major common carrier. The future of private carriers may depend in good measure on the outcome of this suit.

> A third significant measure taken by the FCC to promote diversity and choice for consumers was the Commission's domestic satellite decision (1972). By that decision, the Commission opened up the application of communications satellite technology to multiple suppliers of service.[12]

At least seven satellite communications proposals have been presented to the FCC as a result of this decision, including applications from AT&T, and Western Union, Comsat, and others. The most interesting and ambitious of these is a joint proposal by IBM, Comsat General, and Aetna Insurance to form Satellite Business Systems. SBS will offer the customer integrated digital, voice, and image transmission facilities, directly accessible via sixteen- to twenty-three-foot antennas located at the customer sites.

Another development during this same period was the decision in 1969 to revise the tariff structure for private leased lines. Until that time such lines had been available only on a single-user, full-time basis. But in February of that year AT&T decided to allow a group of users to band together to share a leased line among themselves. This has opened the door for smaller users to enjoy some of the economies of the higher-volume

Telpak lines, which lease for a rate considerably less than that of the corresponding number of ordinary voice-grade lines. Note, however, that this revision does not permit one user to lease such a line and then resell time on it.

The final important development in telecommunications during this period has been the introduction of packet-switched networks and the licensing by the FCC of such organizations to provide common carrier service.[13] In such a network, data are transmitted in the form of "packets" that contain the user's information together with destination and control information that is appended automatically by minicomputers that serve as nodes in the network. Thus the user has no direct control over the transmission of his information. It is transmitted from one minicomputer in the network to another in standard-sized packets until it reaches its destination. There the network minicomputer identifies the information and sends it to the proper terminal or processing computer. By permitting the network to schedule its own message traffic in this manner, a very high volume of traffic can be handled economically. Federally funded research on packet switching is being conducted via ARPANET, a network of more than forty universities and research laboratories, sponsored by the Advanced Research Projects Agency.[14, 15] A commercial packet-switched network service, TELENET, has developed from this, and is available to customers nationwide.[16] Independently of this effort, another commercial network, TYMNET, has moved successfully from more conventional time-sharing services into packet switching. The emergence of commercial firms offering this technology makes it an attractive alternative for library networks.

It is obvious from the above that there must be very close cooperation—and even integration—between the computing and the telecommunications industries in both technical development and services offered. However, current FCC "policy" tends to keep the industries, particularly as represented by AT&T and IBM, at arm's length. Operating under a consent decree, AT&T has agreed not to provide computing services for anyone other than its own internal units. At the same time, there is strong resistance to moves of IBM toward entry into the data transmission business. Technological advances have increasingly blurred the distinction between data processing (computing) and data communication. This blurring is reflected both in IBM's proposal in the Satellite Business Systems venture, and in a request by AT&T for a tariff schedule on a data terminal service that it is proposing. No firm policy has been adopted by the FCC, either because of an unwillingness to test current practices or because of current perceptions of policy. However, the FCC is in the process of reexamining the entire question of the computer and communications interface.

Federal policy in relation to computers and telecommunications is still highly fluid. It is clear that the resolution of policy directions in this area will have a major impact on the development and direction of library in-

formation networks. The most significant and controversial development to date is the Consumer Communications Reform Act, or "Bell Bill," currently before Congress. It is feared that passage of this bill may "effectively abolish newer forms of communications competition," "squelch . . . specialized common carriers," and "knock out some of the 400 independent telephone-equipment suppliers that have sprung up in the past eight years."[17] It should be noted that this is a new approach to the interface problem—neither an anti-trust suit, nor an FCC policy decision, but a direct appeal to Congress.

EVOLUTIONARY NETWORK MODELS

Network models range from the relatively simple "star" network through more complex hierarchical network designs to models that have more flexible and intricate systems of interconnections among the components.[18–20] The star network is typified by a single computer to which a number of terminals are directly attached. The need for separate communication lines and separate entry ports into the computer for each terminal limits the effectiveness size of such a network because of low utilization of some of the lines and consequent high cost. The size can be increased to a certain extent by using dial-up terminals that can share ports and lines, but such a solution imposes the condition that not many terminals can be active at the same time. This model design nevertheless may be feasible if one can establish statistically that the number of available ports and lines exceeds the probable number of active terminals.

In the remainder of this section we will consider a series of models related to the development of a library network for the Southwest. The first of these is a relatively simple extension of the star network concept. Subsequent models evolve from this and outline the development of a regional library service center as the network grows.

Model 1: Shared-Trunk Star Network

A localized star network, with each terminal having a separate line to the central computer, is a very reasonable initial network for industries and universities whose terminals are all relatively close to the computer. However, as the distance between terminals and the computer increases, the cost of maintaining a separate communication line for each terminal becomes excessive. The next step logically is to develop a network that eliminates the need for so many separate lines by allowing a group of terminals to share a single line. An example of such a shared-trunk star network is OCLC, whose member libraries share trunk lines into the central computer at Columbus. Initially AMIGOS had thirty-two terminals sharing one line to Columbus. They currently have five trunks into OCLC, each shared by a maximum of twenty-five terminals. Figure 1 shows the trunk arrangement.

Communication costs for this type of network are affected by the type

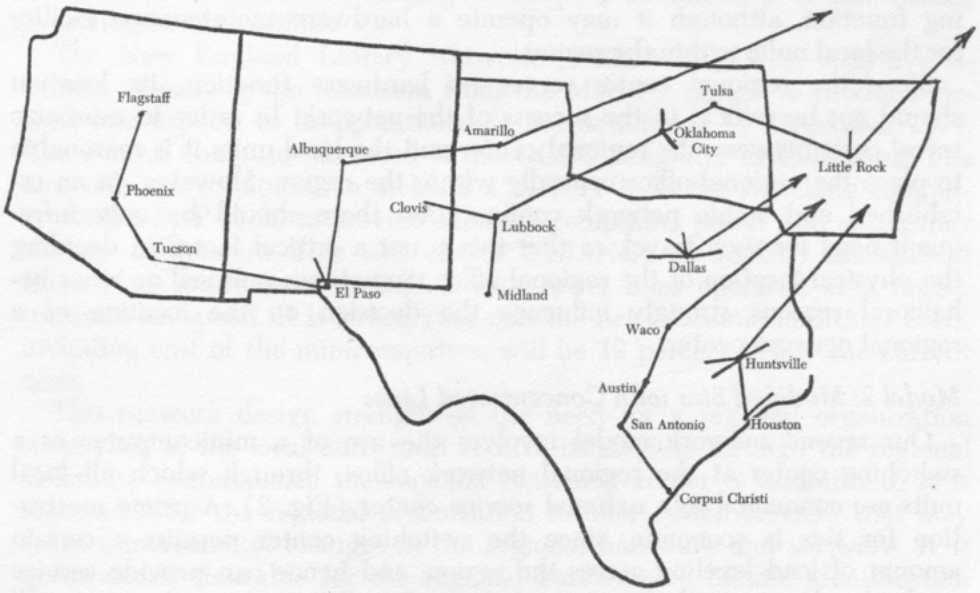

Fig. 1. Model 1: Shared-Trunk Star Network.

of line used, the length of the line, the number of terminals per line, and the allocation of the line to the terminals. Land lines are typically available in voice-grade, with or without various degrees of conditioning, and bundled in a variety of packages strictly for pricing strategies. If terminal attachments to the trunk line are properly arranged, it is often possible to use strictly local lines for these attachments. Thus the per-mile line charge is concentrated primarily in the shared trunk. Such a trunk may be shared in the following three ways: (1) by buffering full messages onto the line, as OCLC currently does; (2) by a frequency division, allotting to each attached terminal its own portion of the available bandwidth; or (3) by a time-division multiplexing arrangement, whereby each terminal has use of the full line bandwidth, but only intermittently, between line use by other terminals.

With the development of a shared-trunk star network one begins to see the growth of regional networking agencies. For this type of network the functions of such an agency are somewhat limited, since each group of terminals could in theory bypass the regional organization, establishing its own shared-line link to the central computing facility. Nevertheless, the regional network agency has several roles that it can play at this stage. It can serve as a coordinator of network development within the region; it can represent in a uniform way the local units in negotiations with the nationally oriented center; it can handle all of the financial transactions between the local units and the nationally oriented service center; and it can provide a training facility for the local units. Note, however, that at this

stage of development the regional center serves no direct hardware operating function, although it may operate a hardware maintenance facility for the local units within the region.

Since the regional center serves no hardware function, its location should not be critical to the success of the network. In order to minimize travel costs between the regional center and the local units it is reasonable to place the regional office centrally within the region. However, in an established and stable network configuration there should be only infrequent need for such travel, so that this is not a critical factor in deciding the physical location of the regional office. Sometimes political or other behavioral reasons strongly influence the decision on the location of a regional network center.

Model 2: Modified Star with Concentrated Lines

Our second network model involves the use of a minicomputer as a switching center at the regional network office, through which all local units are connected to a national service center (Fig. 2). A prime motivation for this is economic, since the switching center permits a certain amount of load leveling across the region, and hence can provide service to the local units with fewer trunk lines. By allowing users access to all trunk lines, this model avoids having users queued up for one line while another is free. For example, it is possible that the model illustrated in Figure 2 would require only three voice-grade lines to provide service equivalent to that available over the five lines of Figure 1. As previously

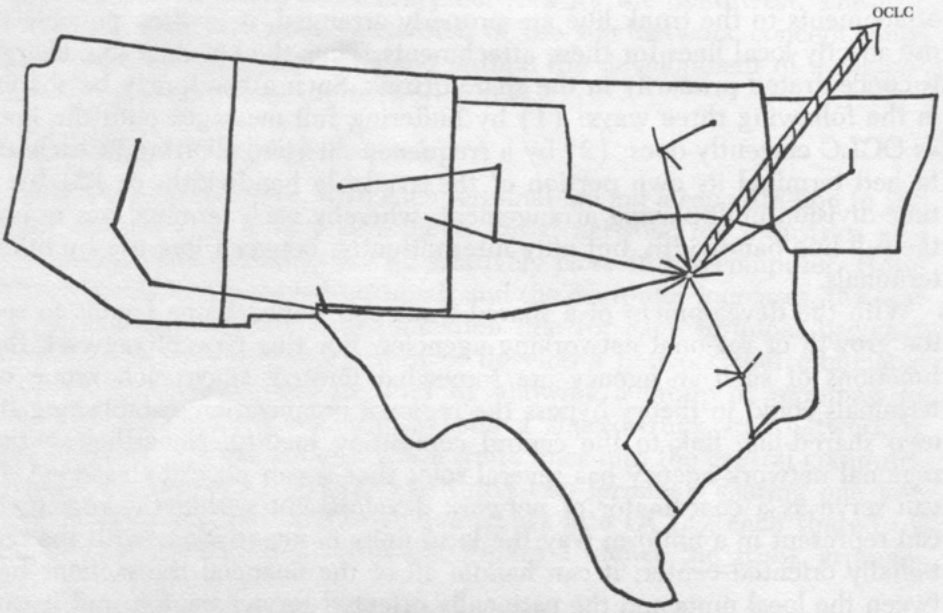

Fig. 2. Model 2: Modified Star with Concentrated Lines.

mentioned, AMIGOS is planning to adopt a modification of this model, involving two trunk lines.

The New England Library Network (NELINET), with sixty-five libraries, is making the transition from the Model 1 design to Model 2 design, and expects to be operational in the new mode by December 1977. The central computer accessed is the OCLC computer in Columbus. The new network configuration includes a PDP 11-10 as the switching computer, with a PDP 11-45 to provide ancillary computing power and emergency backup equipment. This will enable NELINET to replace the current three voice-grade lines to OCLC with fewer lines operated at a higher transmission speed. It is anticipated that the net telecommunications costs, including cost of the minicomputers, will be 12 percent below the current costs.

This network design strengthens the need for a regional organization since each of the local units must receive its services through the regional switching center. Once the regional switching center is established, it is reasonable for the regional organization to offer added services that may require incremental changes in the regional hardware and software. It is quite clearly desirable for the regional hardware to handle identification of the local units for cost accounting, billing, and statistics on their use of the facility. One can further anticipate that some regions will acquire the hardware and software necessary for data editing functions. Initially such editing is simple and restricted to assuring that the data can be transmitted and received correctly; but more sophisticated editing can and will be added to the regional capabilities.

At this stage of development the possibility of a region's providing additional services occurs. These generally involve an enhancement of the hardware and software at the regional center—and the need for added personnel—and may be included either within this stage or later, depending upon priorities. Referring specifically to the AMIGOS network as an example, one such function is the regional production of library catalog cards. This service becomes feasible when the volume of card production is such that the cost of regional production is competitive with the cost (including time delays) of having the cards produced at the central computer site.

A second type of service that the regional center may consider offering to its customers is access to regionally maintained data bases. These data bases can include materials that are heavily used within the region, and materials that are of specific interest to the region. The advantages of regional maintenance of such data bases are twofold: reduction of data transmission charges, and the possibility of tailoring the data bases specifically to the needs of the local units within the region. These advantages are obtained at the cost of maintaining additional storage capabilities and the software to access the data bases.

With very little additional cost beyond that for message switching, the

regional center can provide for its users intraregional communication and conferencing. The messages from one local unit to another and extended computer conferencing can be provided with the addition of some disk storage and some associated software. In fact, with proper planning the same hardware can both handle the conferencing needs and support the regional data bases.

The economic feasibility of this model is highly dependent on the location of the regional switching center. We have already mentioned the reduction of line charges between the region and the national service center, at the expense of more equipment and staff at the regional level. In addition, whereas a connection to a shared trunk, as in Model 1, can often be local, the use of a regional switching center would involve line charges between the local and regional levels for many of the customers. Thus location of the regional center becomes a more complex task, requiring some balance between the regional to national costs, and the local to regional costs. For example, a regional center at Dallas is relatively well situated with respect to a national center in Ohio, being in the eastern end of the southwestern region. It is fortunate that there is also a heavy concentration of local units within the Dallas area, so that local to regional costs are kept quite low despite the distances between Dallas and the western end of the region.

The other side of the economic coin is that the provision of various services at the regional level reduces the demand for such services from the nationally oriented service center. The effects of this are both positive and negative. The reduction of this demand allows the national service center to satisfy the needs of additional customers, or to develop and offer additional services that are beyond the capability of or economically infeasible for the region to offer. However, this same reduction in demand may force the national service center to increase its charges for other services in order to maintain its own health. This alteration in the pricing structure may then have an impact on the economics of the regional center. Such changes must be anticipated by the region.

Model 3: Use of Multiple National Service Centers

We have alluded to the wide variety of library functions that can be provided by a single centralized computer facility. While this is possible, the development and maintenance of these functions at an efficient and sophisticated level is a large task, requiring extensive computer facilities, an adequately trained staff, and tight managerial control. It is reasonable to suppose that any one national service center will be unable to maintain a uniform quality over a broad range of services, and that such a center may opt to provide a more limited range of services that can be maintained at a consistently high level of quality. Even in the event that a national center exercises such an option, it is unlikely that any one center will long enjoy a monopoly on the specialized services that it offers. Thus

multiple nationally oriented service centers become a distinct possibility.

This development of multiple national service centers affords an additional opportunity for the regional centers, and a new role. The regional center can now function as the retailer or broker for the wholesale services provided by the various national centers. Thus the regional center may offer to the local units cataloging from any of three different national centers, serials control from any of four, and so forth. The local centers will have access to a wider range of high-quality services than any single nationally oriented service center could maintain, at a price that is kept reasonable by competition. This can be done at very little additional cost at the regional level, since the equipment to handle the switching and record keeping is present from the Model 2 stage of development.

For illustrative purposes, Figure 3 shows a possible Southwest regional center with trunk lines accessing OCLC, BALLOTS, and the Washington Library Network (WLN). Location of a regional center to minimize data transmission costs for this model becomes a more complex task than it is for Model 2 because of the involvement of several service centers. Furthermore, it is evident that one cannot relocate the regional center every time a new national service is accessed. Thus the use of this model requires extremely careful planning, anticipating all services that are likely to be used in future years. It is also noted that the cost of dedicated trunk lines to each national service is sufficiently high that it is a limiting factor on the number of such services that a given region can access. Finally, the

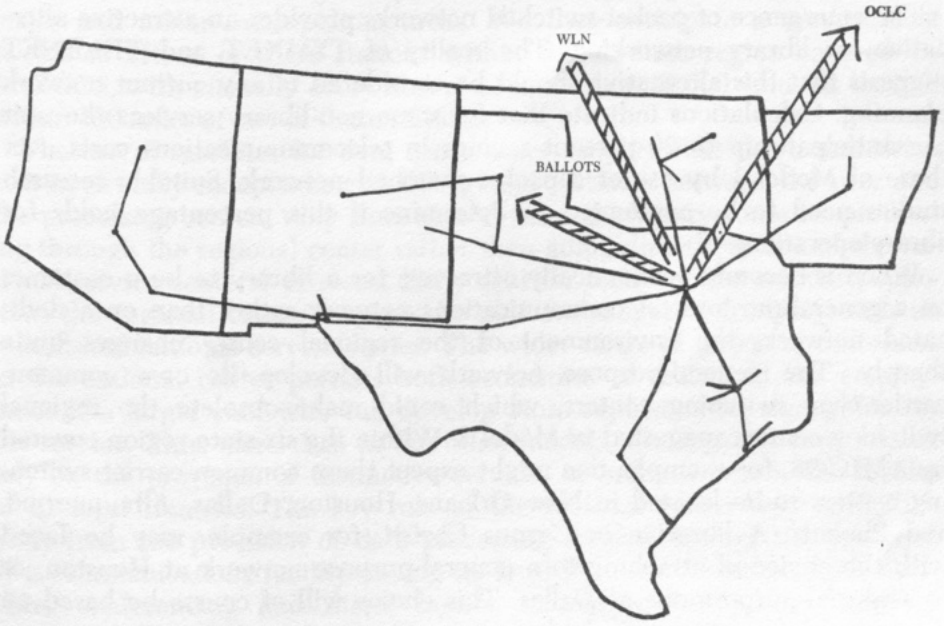

Fig. 3. Model 3: Use of Multiple National Service Centers.

availability of multiple services, accessible through various regional centers, may weaken the dedication of a local library to any one regional center, thus blurring regional boundaries and introducing competition at the regional level. Nevertheless, this is a reasonable model for regional network development, provided that a region exercises care in its planning and implementation based on the model. However, many regions may find Model 4 more attractive.

Model 4: Packet Switching Networks

The regional center concept under Models 2 and 3 is based on the fact that each of the local libraries turns to the regional center as its agent in the quest for computerized library services. As general-purpose telecommunication networks become established throughout the country, one can envision a model in which the library is not served by a separate network, but rather exists as a member of one class of users on one of the general-purpose networks. In Model 4 precisely this situation is foreseen, with the result that there is no longer a dedicated telecommunication line joining a regional center to a national service center. Under this model, the regional center assumes the responsibility for evaluating and choosing among competing telecommunication services, as well as among competing national library services, and each national library service assumes the responsibility of assuring that its services are available via one or more of the telecommunication networks. A number of such commercial networks are presently available, and it is anticipated that use of these networks by libraries will increase rapidly.

The emergence of packet-switched networks provides an attractive alternative for library networking. The reality of TYMNET and TELENET suggests that this alternative should be considered in any current network planning. Calculations indicate that for some non-library services the user can anticipate up to 20 percent savings in telecommunications costs over those of Model 1 by use of a packet-switched network. Suitable research studies need to be conducted to determine if this percentage holds for library operations.

When it becomes economically attractive for a library to be a customer on a general-purpose telecommunications network rather than on a dedicated network, the environment of the regional center changes quite sharply. The general-purpose network will develop its own common-carrier-type switching centers, which could make obsolete the regional switching centers suggested in Model 2. Within the six-state region covered by AMIGOS, for example, one might expect these common-carrier switching centers to be located in New Orleans, Houston, Dallas, Albuquerque, and Phoenix. A librarian in Corpus Christi, for example, may be faced with the choice of attaching to a general-purpose network at Houston, or to a special-purpose one at Dallas. This choice will of course be based on the cost and the services available.

In such an environment it is entirely possible for a regional library organization to atrophy. To prevent this end, the regional organization must actively take steps to induce the libraries within the region to continue to use its services. An attractive pricing structure and the offering of distinctive services can do much in this line. In addition, by proper planning the regional organization may be able to use the commercial network to its direct advantage. This implies that the regional library center should be located near one of the general-purpose switching centers; that its hardware, software, and contractual obligations should be such that it can quickly join the general-purpose network whenever this becomes advantageous; and that its policies, services, and pricing structure should be such that its customers will be induced to channel their telecommunications traffic via the general-purpose network through the regional center for processing. Thus a librarian in Corpus Christi may link to the network at Houston, but direct his or her traffic into the Dallas regional library center for processing. This can certainly be the case if the regional center provides strong direct services to its customer libraries and provides an attractive brokerage service for those library functions that it does not handle directly.

Model 5: Satellite-Based Networks

The development of a satellite-based network rests on the growth of a set of ground communication stations for transmission to and from the satellites. The technology of this area suggests that these communication stations will be sufficiently inexpensive that they can be established in all major and minor metropolitan areas. We thus anticipate a minimum of twelve to fifteen of these stations within the six-state region covered by AMIGOS, with virtually every library of more than 50,000 volumes located within 100 miles of one of these stations.

The use of satellites for data transmission implies that the transmission cost is virtually independent of the ground distance between the user and the processing center. Why then should the local library route its processing through the regional center rather than going directly to one of the national service centers? It seems likely that for many of the standard functions the regional center may not be able to compete effectively with an established national service center. The wider range of potential customers at the national center permits both economies of scale and the employment of a larger staff who can develop more sophisticated algorithms for the service. Thus more than in the other models, the regional center must rely on the provision of distinctive services in order to retain the loyalty of its local libraries. The key role of the regional center may well shift away from the provision of data processing services toward the provision of a communications facility among its local libraries, including both computer conferencing and direct human communication in the form of meetings and workshops for the librarians within the region.

The development of the above five models rests on the assumption of a free market being operative in the field of library information processing. Given this economy, it seems reasonable to suppose that the library network system will develop along the lines that we have indicated. This development will not be uniform, however, and at any time within the coming five years one may expect to find libraries at all stages of network development. Indeed, it seems reasonable to suppose that one will never arrive at a stable state, with all libraries communicating according to one and only one of the above models. In fact, proponents of packet switching readily admit that its utility is based on an assumption of high traffic density, and suggest that library users who are involved in packet switching may still wish to retain their own regional message switching facilities for lower-volume data transmission. The evolution of the mixture of telecommunications networks under the assumption of a free market economy is of small concern to us. Of more concern is the basic assumption of a free market economy, for any deviation from this assumption will affect the validity of these models.

Model 6: Federally Organized Network

The federal government has also been active in the design and implementation of selected library network services. The Biomedical Computing Network, a strongly hierarchical design, is among the most successful of these efforts.

The Biomedical Computing Network, operated by the National Library of Medicine, is a hierarchical network providing bibliographic retrieval service to the member libraries. The country is divided into eleven regions, with one regional medical library (RML) designated for each region. In theory, requests from the local hospital or university libraries are referred to the RML, and subsequently to the National Library of Medicine if they cannot be filled at the RML. There is never any flow of requests back down other branches of the network. This structure is based on the supposition that the National Library of Medicine contains a copy of every document that is likely to be relevant to any request on the system. In practice, this strictly hierarchical protocol is subverted by direct contact between librarians at lower levels in the network. It is possible that evolution of this network design will recognize and permit such deviations from strictly hierarchical protocol.

The report by Westat, Inc. to the National Commission on Libraries and Information Science suggests the possibility of an imposed federal network design, supported by substantial federal funds. Specifically, the report recommends that "a National Library Network be established as an independent agency of the Federal Government . . . ," and that this network consist of three coordinated systems:

> a Resource System designed to provide guaranteed access to all needed materials . . . , a Bibliographic System designed to provide a unique au-

> thoritative bibliographic description for each item . . . , a Communications System designed to provide on-line communication of bibliographic data and requests for data and services. . . .[21]

The network suggested in the Westat study is basically hierarchical, with five distinct levels in the structure: national, regional, zonal, state, and local. Two sample network organizations are described. Each has four regions consisting of two or three multistate zones per region. Each zone in turn contains from two to eight states. In contrast to the Biomedical Computing Network, flow throughout this hierarchical structure is two-directional, with the possibility that a request at any level in the hierarchy may be handed down to a library or center at a lower level within that portion of the hierarchy as well as passed on up toward the national level. In addition, at the regional level it is possible to transmit a request directly to another region without going through the national center, although the analogous request structure is not available at the zonal or state level.

The development of such a federally backed network, should it occur, would have a strong impact on other network ventures. The Westat report is cognizant of this impact, stating that, "The network should be built on existing systems, encouraging their adaptation, as necessary, to new patterns and more widespread goals."[22] The sample network organizations in the report are also drawn up taking cognizance of the existing library consortia and networking efforts.

The acceptance of the Westat report and the development of a national library network based on its recommendations is certainly a possibility that must be considered in any planning that is done at a regional level. This means that regional centers offering nationwide services should both provide input to developing federal plans and remain flexible enough in their structure, equipment, and policies that they can adapt readily to the federal library network, should one really develop.

CONCLUSIONS AND RECOMMENDATIONS

In the course of this study we have examined existing and planned library networks and have observed them to fall into one of the six model types that we have defined. The availability and cost of both telecommunications and computing services are large factors in any decision to implement a specific type of network, and in the operating budget of such a network. We observe also that the momentum toward networking and other cooperative endeavors is strong, with nearly 150 different efforts involving virtually all major and many minor libraries in the country. In such an atmosphere it is all too easy to make hasty and ill-considered decisions. Therefore we make the following recommendations.

1. Because of the existence of several network models, and the possible rapid evolution through these models, there is a need for network planning guidelines that enable each library network to develop in an

orderly manner, with sufficient flexibility to incorporate changes in design and technology, and guidelines that enable each individual library to make rational decisions on the use of network facilities. A study aimed at developing these guidelines should be undertaken as soon as possible.

2. Because of the importance of costs and pricing in the viability of a network, and because telecommunications costs form a major component of network operating expenses, there is a need for accurate cost studies of networks, examining in particular the relationships between telecommunications costs, the levels of service provided, and the frequency of use of each service. NELINET is planning to gather the statistics for such a study; we recommend that other networks follow suit.
3. With specific recognition that commercial packet-switched networks are available, and that satellite-based networks are not far behind, we recommend two evolutionary paths for developing networks. For those networks currently in the Model 1 stage, we recommend that with proper justification they progress as rapidly as possible to Model 2 or to limited forms of Model 3. We believe that this will enable them to provide a significant improvement in services to their member libraries. For those networks that are still in the planning stages before Model 1, we recommend that they consider passing directly to Model 4. They do not have a heavy investment in hardware and software at present, and it appears certain that at least one packet-switched network will be available for use before they could order, install, and bring into operation their own equipment. Likewise, networks that are in the progression from Model 1 to Model 3 should consider the possibility of interrupting this progression to move directly to Model 4. Such a move requires careful study and should not be undertaken lightly.

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The National Library of Canada Authority Subsystem: Implications

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The automated authority system at the National Library of Canada was described in the December 1976 issue of JOLA. *This paper explores actual and potential implications of system features such as the normalized key, and the ability to store and control authorities for multiple languages, applications, and libraries with respect to National Library cataloging, MARC distribution, CONSER, the Canadian Union Catalogue, and shared cataloging.*

NATIONAL LIBRARY CATALOGING PROCESS

The National Library of Canada has begun to build a resource file of MARC records by purchasing the retrospective MARC II file from the Library of Congress (LC). MARC II records for current American imprints are also being obtained in exchange for Canadian MARC (CAN/MARC) records as part of an exchange agreement concluded with the Library of Congress in the spirit of Universal Bibliographic Control.[1] Similar agreements have so far been concluded with the Bibliothèque Nationale, Paris, and with the National Library of Australia. British National Bibliography (BNB) MARC records are being received on the basis of a special purchase and redistribution contract.[2]

Programs have been implemented which permit National Library staff to search the resource file by control number, title, and entry/title compression codes and to transfer applicable records from the resource file to the National Library file. (As of July 1976 the resource file contained only CAN/MARC and LC MARC II records.) For transferred records, a program-generated proofsheet is used to initiate the editing cycle.

Figures 1 and 2 give a very brief overview of the cataloging process for the National Library of Canada's general collections. The split program (illustrated in Figure 1) removes headings from the 1XX, 1XX and 2XX, 4XX, 6XX, 7XX, 8XX, and 9XX fields of MARC records and matches them against the existing authority file via the normalized key. If an authority record for the heading exists, the authority record control number

is inserted in the bibliographic record in place of the heading. If an authority record does not exist, a new record is created. Content designation, content, and control data in this newly generated record are determined by the content and coding of the heading field in the bibliographic record, and by default conditions in the program. The split program will be used to extract headings from the approximately 75,000 records now resident in the National Library's internal bibliographic file and to add them to the authority file. Headings in the Biblio Master File referred to in Figure 1 will then be replaced by authority record control numbers.

Once the split module has been fully tested against the CAN/MARC records, the program will be modified to permit the headings which appear in other national MARC records to be posted to the authority file. Appropriate control information and default conditions will have to be devised. Policy decisions will have to be made as to which headings will be retained and how they will be coded based on the bibliographic service objectives that the National Library hopes to encourage. An example of the type of difference that will have to be resolved is illustrated in the recording of a personal name in both the LC MARC II record distribution service and the Canadian MARC Tape Pilot Distribution Project:

Colie, Rosalie L., 1924–1972	CAN/MARC
Colie, Rosalie Littell	LC MARC

Catalogers at the National Library will be forced to reconsider which is the correct heading in accordance with *AACR* 43A. The decision is academic and only the process is significant. In all likelihood, each LC heading will be posted to the authority file. These headings will be linked to corresponding headings employed by the National Library, and any changes in desired usage of the headings by the National Library will be recorded by updating the usage control fields. Once a decision has been recorded, all future transfers of LC MARC II records that use the name heading "Colie, Rosalie Littell" will be machine-adjusted in accordance with National Library authority record usage specifications. For example, if the LC version of the name is considered a see reference, then it would automatically be replaced by the CAN/MARC version before production of the cataloging proofsheet. This decision is displayed on the proofsheet that is produced by the Biblio File Update/Authority Interface Edit (see Figure 3). Recall that uses other than "see-from" may be specified for other applications/libraries for the LC version of the name.

The implementation of the split program has major implications for cataloging functions within the National Library. For example, once the bilingual subject headings in currently available CAN/MARC records have been transferred to the authority file, then any subject heading in an LC MARC II record that matches a heading already used in a CAN/MARC record can be replaced with the appropriate subfield "u." The French equivalent heading is thus available to the LC MARC record. Not

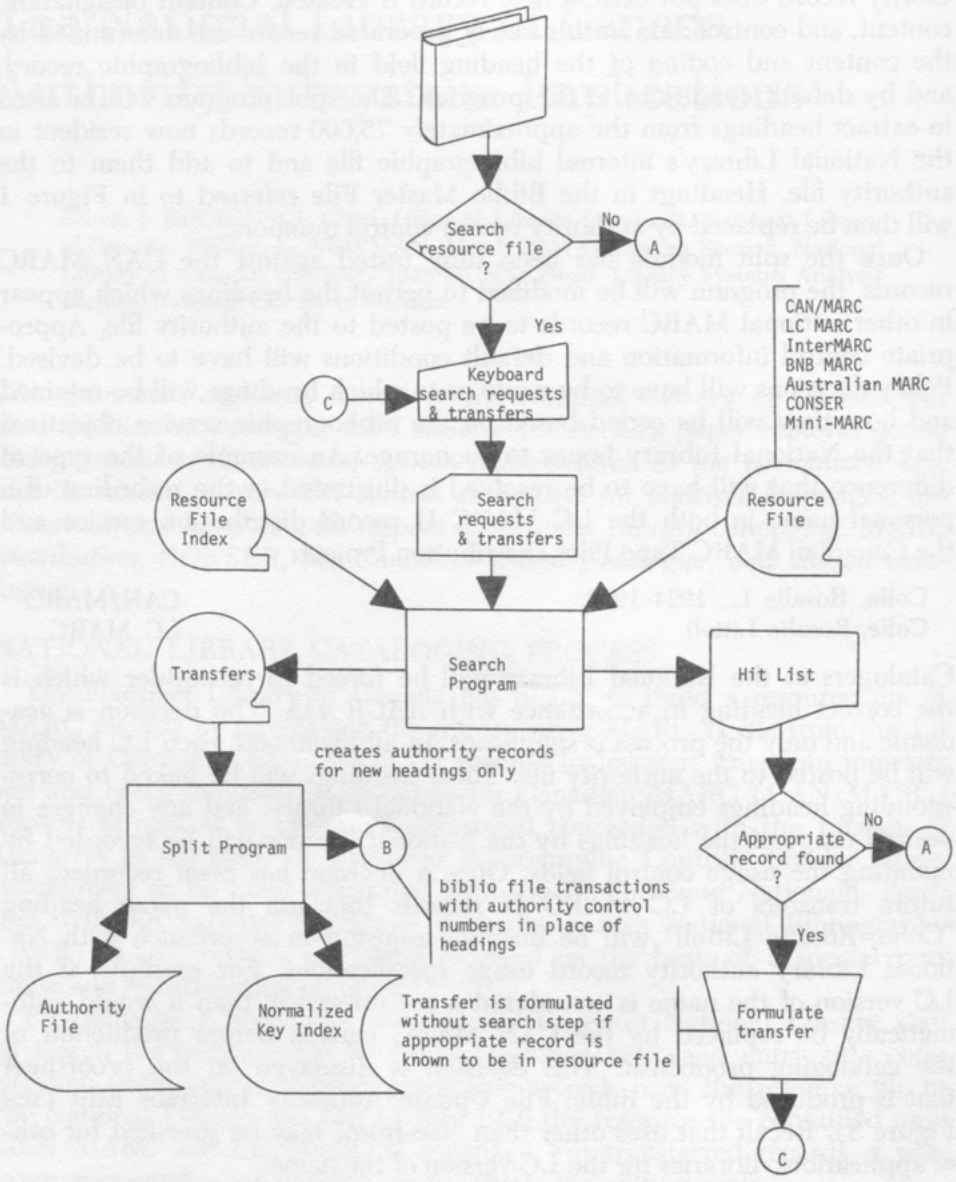

Fig. 1. National Library Cataloging Process.

only are the bilingual data available automatically, but the need to check the National Library authority file may be eliminated because messages produced by the split program will indicate that the heading is valid for the National Library. Any authority heading which does not match an existing authority record will be used to create a new authority record. The

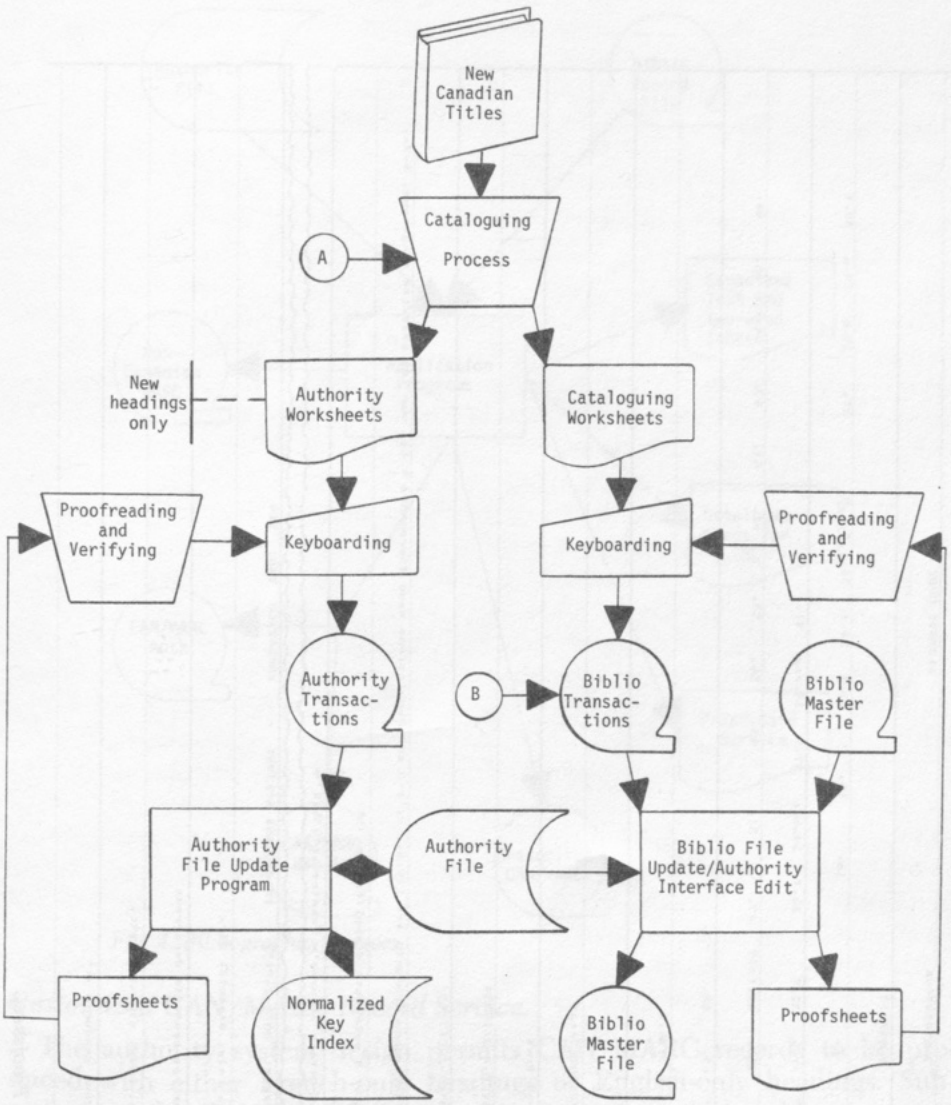

Fig. 2. National Library Cataloging Process (Continued).

records created as a result of a transfer from a bibliographic record of another national institution will have a special status assigned to indicate that the heading originated from a recognized national source but that the heading has not yet been used by the National Library.

BIBLIOGRAPHIC SERVICES

Figure 4 illustrates the new or enhanced bibliographic services that will be available through the association of the authority file and the Biblio Master File.

```
MASTER RECORD. DATE ENTERED ON FILE 76/05/03          CAN'A PART(S)  7

001          NL      760702470E%                                  HISTORY CODE

004                  1.24501C

008                  1.                  16.     19.     23.0  24.1  25.1,3,6,8      27.   28.c  29.a  30.1

                     31.m  32.5      33.7  34.enc  37.f  38.eng  41.

                     42.s  43.1975  47.     51.     55.   56.   57.     61.   62.   63.   64.x  65.   66.

                     67.   68.   69.

020            ‡bclpa. :‡86.%

026            ‡a‡1%

040            ‡abtCaOONL‡eng%

041          0 ‡ateng fre%

086          10‡atYX75-H-3/1975%

110           0‡u‡0000-J-0177%

245          10‡abtHazardous products act :‡tR.S., c. H-3 and Regulations made thereunder = Loi sur les produits dangereux, S.R.,
             c. H-3 et R`eglements d'application. -%

260          0 ‡abc‡[Ottawa :‡bQueen's Printer],‡c1975.%

AUTHORITY  CONTROL  NUMBER:  0000-J-0177    IN PROCESS STATUS:  v    REFERENCE  TAG:  110

        110   Canada. Lois, statuts, etc.

        140   Loi sur les produits dangereux

        210   Canada. Laws, statutes, etc.

        240   Hazardous products act

RECORD VERIFIED
```

Fig. 3. Bibliographic Proofsheet.

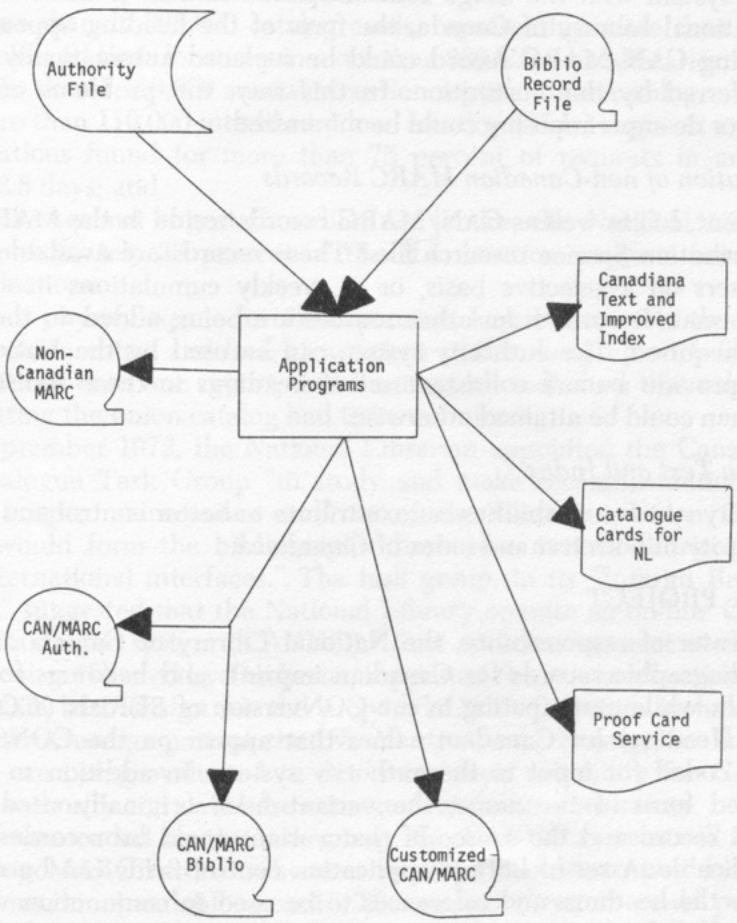

Fig. 4. Bibliographic Services.

Customized CAN/MARC Record Service

The authority system design permits CAN/MARC records to be produced with either French-only headings or English-only headings. Subscribers to the CAN/MARC Distribution Service would be able to request a language option for headings in the records they receive, thereby eliminating equivalence data fields from the CAN/MARC records. Libraries and networks which utilize the bilingual access points provided by the current 9XX field could continue to receive bilingual CAN/MARC records.

CAN/MARC Bibliographic Plus CAN/MARC Authority Records

If CAN/MARC bibliographic records were supplemented by an authority service, subscribing libraries could select those headings acceptable for use with their bibliographic records and those which were to be considered see references for their particular institutions. By implementing an

authority system with the usage control options similar to those available at the National Library of Canada, the form of the heading appearing on an incoming CAN/MARC record could be replaced automatically by the form preferred by that institution. In this way, the problems of superimposing or de-superimposing could be minimized.

Redistribution of non-Canadian MARC Records

At present, LC as well as CAN/MARC records reside in the MARC Records Distribution Service resource file.[3] These records are available to Canadian users on a selective basis, or as weekly cumulations in a CAN/MARC format. Records from other sources are being added to the file as they are acquired. The authority system can be used by the National Library to provide a more consistent set of headings in these redistributed records than could be attained otherwise.

Canadiana Text and Index

Authority system capabilities can contribute to better control and greater data integrity in both text and index of *Canadiana*.

CONSER PROJECT

As a center of responsibility, the National Library of Canada authenticates bibliographic records for Canadian imprints and headings for Canadian names while participating in the CONversion of SERials (CONSER) Project.[4] Headings for Canadian names that appear on the CONSER file could be coded for input to the authority system. In addition to the authenticated form of the name, the variant form originally used in the CONSER record and the source of that variant could be recorded whenever applicable. A set of library/application control fields can be reserved to specify the headings and references to be used in conjunction with the CONSER file.

Serials records for Canadian imprints are contributed to CONSER in two different modes. Current titles which appear in *Canadiana* are created through the *Canadiana*/Cataloguing Subsystem and forwarded to the Ohio College Library Center (OCLC) on tape (in the Canadian MARC communication format for serials). Retrospective titles are entered online to the OCLC center in Columbus, Ohio, in the CONSER format.

Planned distribution of the CONSER file by the National Library makes it important that records possess the bilingual content required by the Canadian MARC format. The ability to add equivalence data to unilingual CONSER records can be provided by the authority system if bilingual authority records have been created for all appropriate headings used within CONSER.

CANADIAN UNION CATALOGUE

The Canadian Union Catalogue is a valuable Canadian information re-

source.[5, 6] Some operational statistics are:

- more than 12,000,000 catalog cards, representing more than 3,000,000 books and their locations in more than 300 Canadian libraries;
- more than 1,400,000 annual accession reports to the catalog;
- more than 110,000 interlibrary loan location (ILL) requests a year;
- locations found for more than 75 percent of requests in an average of 2.5 days; and
- as the second largest Canadian net lender, the National Library fills approximately 35 percent of the ILL location requests from its own collections.

Lack of physical space for file expansion, lack of access to the file other than by main entry, and lack of sufficient staff to keep up with filing, editing locations onto one report, and locating, all indicated that other means of operating the union catalog had to be examined.

In September 1972, the National Librarian appointed the Canadian Union Catalogue Task Group "to study and make recommendations on the nature, scope, maintenance and use of the Canadian Union Catalogue, which would form the bibliographic base of a national library network, with international interfaces." The task group, in its "Interim Recommendations," suggested that the National Library operate an on-line CANadian Union Catalogue system (CANUC).[7] Cost and development studies, notably the one conducted by Duchesne, supported this course of action.[8]

The data base design for the proposed CANUC system includes an authority structure as part of the overall structure.[9] Existing on-line library systems are being evaluated to determine their suitability for CANUC in light of authority and data base management design constraints.

As recommended by the task group, the CANUC system will make use of existing MARC records wherever possible in order to post locations to existing machine-readable records. The authority system could provide an unexcelled power to locate and use these existing records as follows:

1. An accession can be matched using cross-references with equal facility to matching on established main or added entries because the normalized key for the cross-reference can be linked to the main heading. BNB MARC and CAN/MARC together with the National Library's authority file will provide the beginning of the extensive cross-reference structure required.
2. Headings (e.g., subject, corporate) in French (InterMARC) or German (Maschinelles Austauschformat für Bibliotheken: MAB1) can be linked to English headings for automatic translation and posting of locations. When used in this manner, the authority subsystem is acting as an "intermediate lexicon."[10]
3. Cataloging rules can be transcended through use of the cross-reference structure and knowledge of the source of a heading. The ALA heading, when differing from the AACR form for the same name, is already a see reference in CAN/MARC. Again, cross-references in

the CANUC set of linkages will link headings and provide matching of accessions to existing records.

Formats for reporting monographs and serials in machine-readable form to CANUC (entitled *Canadian MARC Communication Formats: Mini-MARC*) have been published . By identifying each MARC field as mandatory, essential, or required if available (i.e., optional), and by reducing the coding specificity required in most fields through optional use of the fill character, the Mini-MARC accession reporting formats define a range of format detail from minimum Mini-MARC to full Canadian MARC.[11, 12] Libraries planning to report to the CANUC in machine-readable form are encouraged to provide records in the fullest format that their system can attain within this format range.

A Mini-MARC record containing minimally coded headings may have insufficient content designation to support machine filing for published versions of the union catalog (according to accepted library filing rules). This is only an apparent limitation of the reporting format. Records submitted to CANUC will be matched against the CANUC authority file. Any heading which has already been established in this file from earlier source records will automatically be matched, using the normalized key, and replaced by the appropriate authority control number. If the source of the earlier authority record contains a fuller content designation, then the Mini-MARC record, through its association with the authority file, is automatically upgraded, and will automatically contain a fuller content designation. The descriptive cataloging part of the minimally coded Mini-MARC record will reside in the bibliographic record file of the CANUC system unless it is determined that it too is already in the CANUC bibliographic file in a fuller form. Access points (headings) posted to the CANUC authority file from the minimally coded Mini-MARC reports could also be upgraded to the full level by National Library staff before publication of each supplement of the CANUC catalog. It is important to note that less staff time would be involved by using this procedure than by creating fully coded access points from card accession reports. Use of the "fill character" within the tags associated with a Mini-MARC heading will permit staff to deal with the exceptional cases only, while allowing computer programs to upgrade incoming records in accordance with the most complete version of previously posted access points.

SHARED CATALOGING

One of the main objectives of CANUC development is to implement a system which can be expanded into an on-line cataloging support system for use by Canadian federal government libraries. The capabilities of an authority subsystem could be fully exploited in this type of interactive, multilibrary environment. Axiomatically, a properly run shared system results in considerable savings of money, human resources, and time. To these savings, an automated shared cataloging system adds the advantage of flexi-

bility. A bibliographic description, once converted to machine-readable form, may be machine manipulated in a variety of ways to generate differing output products. Manual and automated cooperative cataloging systems have usually been restricted to the creation of bibliographic records. However, the benefits of sharing in the process of record creation accrue equally to the construction of a machine-readable file of authority records. The on-line cataloging support system envisaged as part of CANUC development will offer benefits resulting from the shared creation of both authority and bibliographic records, as well as the benefits deriving from the interface between the authority and bibliographic systems.

A shared-cataloging participant will search the CANUC file for bibliographic records required for material in the local collection. As mentioned previously, the CANUC source file will consist of all records created by the National Library, of records received on foreign MARC tapes, and of union catalog accession reports. If such a cooperative cataloging system becomes operational, the records contributed by each user will also be included in this source file. The descriptive part of a bibliographic record may be modified to reflect local library needs. Library holdings will be appended to the record for union catalog location purposes, and to permit the selection of the record for local output products.

Once the applicable record is located, the headings will be verified for local library use. A participant will be able to display the authority record for each heading in the bibliographic record and examine both the primary authority record and linked records containing variants of the heading. Each library will be able to indicate local use of authority headings through control information which identifies accepted or reference headings (as well as chosen language form) and which permits the establishment of a linking structure appropriate to each library's requirements. Thus the form of a heading displayed in a source bibliographic record need not be chosen for use by a particular library, and it is not necessary to modify the heading part of any bibliographic record. The library-specific control fields of the authority record will be accessed by the program generating local products, and the preferred local use will be reflected in the choice of the heading to be output.

After the library has defined local usage within a cluster of related headings, or has accepted the "neutral" structure, this definition will be available for reuse. Thus each participating library will define its own authority file, i.e., a subset of the complete set of headings, in terms of headings used and relationships between them. This flexible authority capability will overcome, to a large degree, the difficulties described by Ohmes and Jones that occur when interfacing a local catalog with on-line systems where authority capabilities are not present, or are not present in a flexible form.[13a]

If a bibliographic record for a specific item is not located in the CANUC file, and original cataloging must be done by the library, the au-

thority file will be searched for applicable headings. Again it is possible to access and examine a particular authority record and its related records, and the library may choose the heading applicable to its needs. If the heading is new to the library, its choice should be influenced by the source of the potentially useful records.

The authority system will also assist in the retrospective conversion of manual catalog records. The reference structure will point the user to currently used headings and will significantly reduce the amount of data input.

A library whose complete holdings are in machine-readable form is in a strong position to make most effective use of authority system capabilities. As headings evolve through several forms of entry, library use can be modified to select the most current form without worrying about changing paper files. Any products generated after this update will reflect the change in all bibliographic records using the modified headings.

Authority records created or modified by the National Library will be fully coded, reflecting the standards defined for the construction of the neutral file. If no National Library record exists, the choice may be based upon the cataloging rules used to formulate the form of the heading. If no useful authority record is found in the file, the library will have to create the record, and link it, if necessary, to existing authority records. As in other cooperative systems, participants creating or modifying records may be bound to adhere to agreed-upon standards (for both the formulation of headings and the level of content designation) supplemented by conventions to guide the interpretation of these standards. Such restrictions on the creation of headings may not be applicable to their use as headings in a cooperative network in which individual libraries are permitted some scope for adhering to local precedents. Nor could such restrictions be applied to sources of authority records other than shared-cataloging participants.

Participation in a shared-cataloging system designed to interface authority and bibliographic files will result in several benefits: the reduction of original cataloging and of original authority record creation; the elimination of duplicate cataloging effort; shared storage and file maintenance costs; reduction in professional and clerical activity required to maintain bibliographic products; and faster processing and more timely service to patrons. Further, it encourages consistency of practice within and among libraries (a benefit also to patrons) and, by saving technical processing time and money, it frees staff to plan for and expand services without corresponding increases in human resources. The major strength of a shared-cataloging program operated in such an environment is its ability to control composite bibliographic and authority files while preserving the integrity of the individual files of each user so that library-specific bibliographic and authority products may be generated.

CONCLUSION

In its current state of development, the authority subsystem in the National Library will help Canadian libraries through the provision of bilingual authority products such as lists of Canadian government headings and of Canadian subject headings, and by the possible enhancement of existing products and services.

In more general terms, the authority subsystem is the first step in the introduction of the data base management philosophy to National Library processing. This in turn leads to consistent, easy-to-maintain catalogs. In many cases, only the authority record must be changed to introduce current usage and terminology, instead of changing each bibliographic description in which that authority heading is used.

The described benefits can be attained once a comprehensive on-line authority file containing references across languages and across cataloging rules is constructed. These benefits include redistribution of records from multiple MARC distribution sources, after ensuring the consistency of cataloging copy through automatic heading revision; provision of CAN/MARC records customized to searcher or subscriber language or cataloging code requirements; automatic upgrading of MARC content designation and subsequent availability of Canadian Union Catalogue accession reports for cataloging copy; and provision of the capability to maintain multiple-application/library authority files in a shared-cataloging environment.

"Catalog building consists of two phases: (1) the creation of cataloging copy representing the works being added to the collection; and (2) the integration of that copy into the existing catalog. Phase One simply involves the creation of a record; Phase Two determines whether or not the reader will be able to retrieve that record once it has been dropped below the rod among a million others."[14] Automated authority systems of the type implemented at the National Library of Canada are the first library automation efforts to aid the cataloger in the Phase Two integration process as well as in the Phase One tasks.

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A Computer-Produced Newspaper Index

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A computer-generated newspaper index implemented at Iowa State University to replace a card file system is described. The mechanized system employs an algorithmic indexing approach which facilitates data input procedures. The indexer is required to directly select natural-language terms or phrases appearing in the headline or text of the newspaper article as subject descriptors. A comparison with the former card file system indicates that the computer-produced index is cost competitive and provides a more effective retrieval system.

INTRODUCTION

Many university and research libraries, as a public service function, maintain a continuing in-house index, usually in card file format, to the regional or local metropolitan newspaper. For the past twenty-five years, the Iowa State University Reference Department has produced an index to the statewide edition of the *Des Moines Register,* recording on card stock the headlines and dates of articles, using a single-entry subject heading indexing scheme. A degree of non-uniformity of entries has been built into the card file because of the changing Reference Department personnel assigned the indexing task over the years, the shallowness of indexing depth, and an informal manner of monitoring the thesaurus of subject headings. The problem has become acute as the card file has increased in volume, resulting in an unwieldy and inefficient retrieval system.

This paper describes a mechanized approach—an indexing algorithm and programming procedures—for a computer-generated newspaper index which has been implemented by the Reference Department at Iowa State University. The index is based on current research models in retrieval language theory and incorporates character manipulation software techniques that simulate automatic parsing routines by extracting multiple subject access points from single input phrases. The computer-organized file offers improved portability and readability over a card file in addition to an expanded indexing depth.

Large-scale mechanized newspaper indexing systems have been developed and implemented.[1,2] Pasqua, Rayfield, and Showalter suggest several automatic indexing procedures based on word frequency analyses of the full texts of newspaper articles.[3]

However, little has been written concerning library-produced mechanized indexes to local newspapers. Borkowski concluded that automatic recognition techniques to extract personal names, dates, street names, etc., from newspaper text required complex procedures and suggested that manual tagging of textual terms was advisable.[4] Lathrop's *Flint Journal* index began with no agreed-upon subject heading authority list but developed a thesaurus as the index was compiled.[5] Davis, noting the need for more efficient means of accessing local newspaper information, suggested, in a pilot study, the viability of producing a keyword out of context (KWOC) index.[6] These three approaches were expanded upon and modified in response to shortcomings arising in practice.

MECHANIZED INDEXING ROUTINES

In designing a computer-assisted indexing procedure, information scientists have at their disposal a variety of programming techniques. (See Campey for a comprehensive survey.[7]) These techniques can be generally characterized as (1) textual derivative, manipulating natural-language terms, or (2) assignment indexing, adapting artificial-vocabulary indexing schemes for machine formatting.

There is a growing body of evidence, beginning with Cleverdon, Mills, and Keen, synthesized by Sparck Jones and Kay, and recently corroborated by the Aberystwyth indexing research, which suggests that natural-language indexing schemes function as proficiently as more complex controlled-vocabulary languages, and that keyword indexing based on titles and abstracts may be as effective as indexing based on full documents.[8–10]

Newspaper articles include a convenient natural-language article surrogate—the headline. It is standard procedure for newspaper indexes to represent the article by its headline. The headline serves as a mnemonic aid for users knowing a fragment of the title of a previously seen article and also functions as a link key for locating the proper article in the newspaper from the index entry. Since the headline in a computerized index is in machine-readable form, the utilization of a KWIC/KWOC routine applied to the article headline was investigated.

Title-derivative indexes are attractive because they require little human indexing intervention and offer ease of programming. The investigative research measuring the retrieval effectiveness of title-derivative indexes is diverse, reporting document retrievability ratios of 35 percent to 90 percent in various experimental search simulations.[11–13] There are situations, principally in the physical sciences, where a title-derivative process is competitive with single-entry subject indexing. Jahoda and Stursa found this to be true in the chemical literature.[14]

Unfortunately, cursory examination of newspaper article headlines reveals that they manifest the traditional shortcoming of title-derivative indexing—that the headline words may not accurately reflect the intellectual content of the article. The headline FORD LEAVES PEKING, NO

CHANGE IN TIES might imply a sartorial theme, and PHYSICS AND THE LEFT HAND OF LIFE does not suggest the article's content—linking amino acids with a unified field theory. Other shortcomings include the listing of nonsignificant words (e.g., "House" in "White House," the word "Index" in the title "Recent Tree Ring Calibrations Provide an Index to the Accuracy of C-14 Dates"), long blocks of undifferentiated uniterm entries because of the absence of precoordination (e.g., "pollution" rather than "air pollution," "water pollution," etc.), and the presence of variant forms (e.g., "sulphur," "sulfur") and synonyms scattered throughout the index (e.g., "highways," "roads," "expressways," "freeways"). One has to evaluate the purpose and scope of the particular indexing project before deciding whether a title-derivative index yields an acceptable retrieval file. A feasibility study was performed which showed that only 40 percent of the desired subject entries could be extracted from the headlines. It was decided that an indexing vocabulary utilizing only headline words could not meet our needs and that headline augmentation from the text of the article was necessary. The feasibility study also demonstrated the validity of a natural-language indexing vocabulary, showing that patrons approached the newspaper index with a specific person, place, or event in mind—information retrievable from words appearing in the headline or text of articles.

As mentioned previously, examining abstracts for augmented natural-language terms appears to be as effective as examining the full text of the document. Although newspaper articles do not contain an abstract, it is an axiom of newspaper journalism that the first paragraphs, referred to as the lead, contain a capsule summary of the entire article. Thus, the headline, the subheadline, and the lead of a newspaper article are analogous to a title-with-abstract document and can function as such in an indexing vocabulary. Regarding title words as pointers, or antecedents, to a preferred form of entry term in the body of the article increases the validity of this approach. For example, the headline SURPRISE VOTE OF FARM BUREAU OUSTS KUHFUSS—CALIFORNIAN NAMED contains two pointers—"Kuhfuss," which would be entered in the index as "Kuhfuss, William" to distinguish him from others with the same surname, and "Californian," which points to the entry "Grant, Allen" within the article.

INDEXING ALGORITHM

In creating a computer-produced newspaper index, the practitioner in the field must formulate an indexing strategy by taking into account the anticipated amount and manner of index usage in conjunction with constraints on indexer time and software parameters. We concluded, based on indexing research, patterns of usage, and considerations of indexer industry and programming ease, that a natural-language indexing vocabulary,

using terms from the headline and lead, was the most suitable for our needs.

The program is written in PL/1(F), in 5K object bytes, and uses the IBM SORT/MERGE utility. Job processing is done in a multiprogramming environment on an IBM 370/158 and IBM 360/65 coupled system with the I/O expediting feature HASP (Houston Automatic Spooling Process).

For this application a hybrid indexing algorithm employing a natural-language vocabulary with both derivative and assignment components was decided upon. The chosen approach emphasizes the simulation or mirroring of automatic term extraction techniques by requiring the indexer to sequentially scan terms in the headline and lead, looking for relevant words or noun phrases. These assigned terms are then tagged or coded for inclusion in the index as subject descriptors.

The algorithm to be followed by the indexer is as follows:

1. Examine the headline and, when appropriate, the subheadline for significant uniterms or multiword phrases and then tag them in the input code by enclosing them with parentheses.
2. Identify pointers from the headline and enter the preferred form of the pointer in the augmented terms field.
3. Enter additional descriptive terms or phrases from the lead (two or three beginning paragraphs) in the augmented descriptors field.
4. Analyze the multiword descriptor strings that were tagged in the headline or entered in the augmented descriptors field and manually tag substantive embedded terms or provide vocabulary links by entry of a see or see also reference.

Some manual editing of textual terms is prescribed with certain standardizing conventions, e.g., Iowa state agencies are entered under the agency name without the term "Iowa" preceding, and personal names include both surname and given name—"Smith, John." Also, although no thesaurus is used, the index itself serves as a thesaurus in maintaining consistency of entry and suggesting cross-references. Using textual words as descriptors, rather than employing a predetermined thesaurus, gives the newspaper indexing language a dynamic quality, allowing it to assimilate new terms as they appear in contemporary usage.

An iterative phrase transposition procedure derives additional subject entries by extracting from the multiword phrases the significant embedded components tagged at the input stage, and rotating them in an order-preserving manner into the lead term position for output with the headline and date/page/column as a separate entry. For example, the phrase

STAINED GLASS CHURCH WINDOWS

when entered in the coding stream with articulation symbols (#) in the multiword unit such as

STAINED#GLASS#CHURCH WINDOWS

will yield three subject headings:

STAINED GLASS CHURCH WINDOWS
GLASS CHURCH WINDOWS-STAINED
CHURCH WINDOWS-STAINED GLASS

Syntactical structure is provided by the insertion of a hyphen following the permuted segment to separate the permuted unit from the remainder of the natural-language phrase. Thus, multiword phrases serving as index access points either will be natural-language units or will contain a hyphen identifying the end point of the original phrase. This technique sidesteps the problems encountered with fixed-word-order indexing schemes which provide structured hierarchical roles or facets but create ambiguity with entries such as "School–Library," where the user must decide whether the entry refers to school libraries or library schools.

Approximately 20 minutes a day is spent examining the newspaper and selecting an average of 7.8 articles, with the indexing and coding onto a worksheet of a selected article occupying an average of 1.2 minutes. The scope of indexing coverage, following local indexing conventions, includes articles concerning events relating to or having ramifications in Iowa, but excludes sports stories, crime reports, and items easily accessible through the *New York Times Index*. However, at the discretion of the indexer, articles of a topical nature likely to be valuable to students for use in short papers or speech assignments (e.g., Loch Ness monster, scientific breakthroughs, Vikings in Paraguay, etc.) are indexed.

The input record (see Figure 1) is composed of three variable-length fields separated by a field delimiter character (°):

1. the headline of the article, with tagged words or phrases enclosed by parentheses;
2. an optional augmented subject descriptors field (words or phrases are culled from the text of the article and separated by semi-colons); and
3. the acronym DMR (denoting *Des Moines Register*), the date, and pagination.

Provision has been made for vocabulary links by allowing for the inclusion of see and see also references. The file is monitored by the entire reference staff and cross-references are incorporated as the need arises. They are reprinted in their entirety with each run so that the most recently produced index will contain a cumulative listing of the cross-references in the file.

The printed output (see Figure 2) is in an uppercase, one-title-per-line KWOC format, 132 characters in length, and consists of three fields:

1. a subject descriptor field, comprising 31 characters, consisting of single words or multiword phrases (there are an average of 2.85 subject

descriptors per article; approximately 40 percent of the lead terms are extracted directly from the headline);
2. the headline of the article, in a field of 65 characters; and
3. the date, page, and column of the newspaper in which the article appeared, occupying the remainder of the record.

The KWOC-style display offers increased readability over standard KWIC and insures the certain inclusion in the entry of the beginning portion of the headline. The headline, in addition to the page number, column, and date, facilitates locating the proper article in the newspaper from the index entry.

The primary sort field for each output record is the subject descriptor, with secondary sorts on the year, month, and day, in that order. In this way, articles concerned with the same topic will be arranged in chronological order.

The file is arranged in a dictionary catalog manner, with descriptors reflecting subject content, personal names, and corporate bodies integrated into a single alphabet.

The index is currently produced on a biweekly basis with quarterly and annual cumulations. In addition to the Reference Department, copies are located in the Government Publications Department and in the Media/Microform Center of the library, where the microfilm holdings of the newspaper are kept.

In a mechanized retrieval system, the primary cost factors are input related, involving preparation of data for machine organization and input/output operation overhead costs in batch processing.[15] Thus, the streamlining of input procedures is of paramount concern in this indexing algorithm. Specifically:

1. For economy of keyboarding, input records are stream coded on worksheets, rather than coding forms, with variable-length fields.
2. The use of a phrase manipulation routine, after Rao's Postulate-based Permuted Subject Index (POPSI), to generate multiple-subject entries from single-input phrases makes changing the order and recoding the multiword phrases unnecessary.[16]
3. Tagging words and phrases in the headline for inclusion obviates recording them in the augmented descriptors field and also eliminates the expensive procedure of matching title words with a dictionary stop word list, a process that can account for 15 percent of the total computing time involved.[17]
4. The indexer is not required to scan the entire text of the article for keywords, but only the headline and lead.
5. The indexer records the actual headline as it appears in the newspaper article, rather than constructing a statement summarizing the content of the article—a procedure used in the Bell and Howell newspaper indexes.

For those subject descriptors which are not headline extracted (60 per-

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*3 IOWA BUILDINGS NAMED U.S.(HISTORIC#LANDMARKS)*OLD CAPITOL;MERCHANT'S NATIONAL
 BANK#GRINNEL;VAN ALLEN AND SON#CLINTON*DMR 01-20-76 P.3,C.2*
*SEE'S(UFO'S)LINKED TO(CATTLE MUTILATIONS)**DMR 01-15-76 P.2,C.4*
*MUTILATIONS- -SEE 'CATTLE MUTILATIONS'
*FLYING SAUCERS- -SEE 'UFO'S'
*7 PCT. ENROLLMENT JUMP*COLLEGE#ENROLLMENT*DMR 12-18-75 P.5,C.1*
*UNIVERSITY- -SEE ALSO 'COLLEGE','IOWA STATE UNIV','UNIV OF IOWA'
*COLLEGE- -SEE ALSO 'UNIVERSITY'
*RECENT(TREE RING)CALIBRATIONS PROVIDE AN INDEX TO ACCURACY OF(C-14 DATES)*ARCHA
EOLOGY;CARBON#DATING*DMR 01-23-76 P.9,C.5*
*IOWAN LEADS DRIVE TO REVIVE(TRAIN SERVICE)TO WEST COAST*KEITH,WILLIAM;WESTERN A
SSOCIATION OF#RAILROAD PASSENGERS*DMR 09-28-75 P.5,C.6*
*POT THIEF CAN'T RESIST BAIT, DIES IN(POLICE)TRAP*MARIJUANA;MOUSE;DES MOINES#NAR
COTICS SQUAD*DMR 01-21-76 P.1,C.4*
*POT- -SEE 'MARIJUANA'
*(NATIONAL#AIRLINES#STRIKE)ENDS**DMR 01-01-76 P.1,C.2*
*ELUSIVE(LOCKRIDGE#MONSTER)HAUNTS(TURKEY CREEK)*SASQUATCH*DMR 11-21-75 P.1,C.1*
*BIGFOOT- -SEE 'SASQUATCH'
*PHYSICS AND THE(LEFT-HAND)OF LIFE*AMINO ACIDS;UNIFIED#FIELD THEORY*DMR 11-21-75
 P.3,C.5*
*2(PAINTINGS)UNVEILED AT(KEOKUK)*WHEAT,JOHN*DMR 10-24-75 P.6,C.4*
*FAA: NONSENSE TO(BERMUDA TRIANGLE)*UFO'S*DMR 10-23-75 P.9,C.6*
*SMITH, MARTIN CLASH OVER OFFICE IN(WASHINGTON)FOR DOT*DEPT OF TRANSPORTATION;SM
ITH,JAMES;MARTIN,WILLARD*DMR 12-20-75 P.8,C.2*
*STAINED GLASS WINDOWS STOLEN FROM CHURCH*STAINED#GLASS#CHURCH WINDOWS;CEDAR RAP
IDS CHURCH*DMR 01-12-76 P.1,C.2*
```

Fig. 1. Sample Input Format.

cent of the total descriptors), the headline may provide no contextual assistance. In these cases the multiword descriptor capability provides precoordination and eliminates false drops. For example, the following uniterm subject descriptors (left column) with their corresponding headlines (right column) are uninformative:

COMMERCE	REVIEWS N-PLANT SPECIFICATIONS
STRIP	ENVIRONMENT COUNCIL HOLDS HEARINGS
MERCHANT'S	3 IOWA BUILDINGS NAMED U.S. HISTORIC LANDMARKS

whereas the following multiword subject descriptors provide syntactical structure:

COMMERCE COMMISSION	REVIEWS N-PLANT SPECIFICATIONS
STRIP MINING	ENVIRONMENT COUNCIL HOLDS HEARINGS
MERCHANT'S NATIONAL BANK OF GRINNELL	3 IOWA BUILDINGS NAMED U.S. HISTORIC LANDMARKS

The importance of providing access to the significant embedded terms in multiword strings is illustrated by the third entry above, in that an additional access point is provided in the file for the user seeking entry by the name of the town (Grinnell) via

GRINNELL-MERCHANT'S NATIONAL BANK OF	3 IOWA BUILDINGS NAMED U.S. HISTORIC LANDMARKS

SUBJECT INDEX TO ARTICLES IN THE DES MOINES REGISTER

AIRLINES STRIKE-NATIONAL	NATIONAL AIRLINES STRIKE ENDS	DMR 01-01-76 P.1,C.2
AMINO ACIDS	PHYSICS AND THE LEFT-HAND OF LIFE	DMR 11-21-75 P.3,C.5
ARCHAEOLOGY	RECENT TREE RING CALIBRATIONS PROVIDE AN INDEX TO ACCURACY OF C-1	DMR 01-23-76 P.9,C.5
BERMUDA TRIANGLE	FAA: NONSENSE TO BERMUDA TRIANGLE	DMR 10-23-75 P.9,C.6
BIGFOOT- -SEE 'SASQUATC		
C-14 DATES	RECENT TREE RING CALIBRATIONS PROVIDE AN INDEX TO ACCURACY OF C-1	DMR 01-23-76 P.9,C.5
CARBON DATING	RECENT TREE RING CALIBRATIONS PROVIDE AN INDEX TO ACCURACY OF C-1	DMR 01-23-76 P.9,C.5
CATTLE MUTILATIONS	SEE'S UFO'S LINKED TO CATTLE MUTILATIONS	DMR 01-15-76 P.2,C.4
CEDAR RAPIDS CHURCH	STAINED GLASS WINDOWS STOLEN FROM CHURCH	DMR 01-12-76 P.1,C.2
CHURCH WINDOWS-STAINED GLASS	STAINED GLASS WINDOWS STOLEN FROM CHURCH	DMR 01-12-76 P.1,C.2
CLINTON-VAN ALLEN AND SON	3 IOWA BUILDINGS NAMED U.S. HISTORIC LANDMARKS	DMR 01-20-76 P.3,C.2
COLLEGE ENROLLMENT	7 PCT. ENROLLMENT JUMP	DMR 12-18-75 P.5,C.1
COLLEGE- -SEE ALSO 'UNIVERSITY'		
DATING-CARBON	RECENT TREE RING CALIBRATIONS PROVIDE AN INDEX TO ACCURACY OF C-1	DMR 01-23-76 P.9,C.5
DEPT OF TRANSPORTATION	SMITH, MARTIN CLASH OVER OFFICE IN WASHINGTON FOR DOT	DMR 12-20-75 P.8,C.2
DES MOINES NARCOTICS SQUAD	POT THIEF CAN'T RESIST BAIT, DIES IN POLICE TRAP	DMR 01-21-76 P.1,C.4
ENROLLMENT-COLLEGE	7 PCT. ENROLLMENT JUMP	DMR 12-18-75 P.5,C.1
FIELD THEORY-UNIFIED	PHYSICS AND THE LEFT-HAND OF LIFE	DMR 11-21-75 P.3,C.5
FLYING SAUCERS- -SEE 'UFO'S'		
GLASS CHURCH WINDOWS-STAINED	STAINED GLASS WINDOWS STOLEN FROM CHURCH	DMR 01-12-76 P.1,C.2
GRINNEL-MERCHANT'S NATIONAL BAN	3 IOWA BUILDINGS NAMED U.S. HISTORIC LANDMARKS	DMR 01-20-76 P.3,C.2
HISTORIC LANDMARKS	3 IOWA BUILDINGS NAMED U.S. HISTORIC LANDMARKS	DMR 01-20-76 P.3,C.2
KEITH,WILLIAM	IOWAN LEADS DRIVE TO REVIVE TRAIN SERVICE TO WEST COAST	DMR 09-28-75 P.5,C.6
KEOKUK	2 PAINTINGS UNVEILED AT KEOKUK	DMR 10-24-75 P.6,C.4
LANDMARKS-HISTORIC	3 IOWA BUILDINGS NAMED U.S. HISTORIC LANDMARKS	DMR 01-20-76 P.3,C.2
LEFT-HAND	PHYSICS AND THE LEFT-HAND OF LIFE	DMR 11-21-75 P.3,C.5
LOCKRIDGE MONSTER	ELUSIVE LOCKRIDGE MONSTER HAUNTS TURKEY CREEK	DMR 11-21-75 P.1,C.1
MARIJUANA	POT THIEF CAN'T RESIST BAIT, DIES IN POLICE TRAP	DMR 01-21-75 P.1,C.4
MARTIN,WILLARD	SMITH, MARTIN CLASH OVER OFFICE IN WASHINGTON FOR DOT	DMR 12-20-75 P.8,C.2
MERCHANT'S NATIONAL BANK GRINNE	3 IOWA BUILDINGS NAMED U.S. HISTORIC LANDMARKS	DMR 01-20-76 P.3,C.2
MONSTER-LOCKRIDGE	ELUSIVE LOCKRIDGE MONSTER HAUNTS TURKEY CREEK	DMR 11-21-75 P.1,C.1
MOUSE	POT THIEF CAN'T RESIST BAIT, DIES IN POLICE TRAP	DMR 01-21-76 P.1,C.4
MUTILATIONS- -SEE 'CATTLE MUTILATIONS'		
NARCOTICS SQUAD-DES MOINES	POT THIEF CAN'T RESIST BAIT, DIES IN POLICE TRAP	DMR 01-21-76 P.1,C.4
NATIONAL AIRLINES STRIKE	NATIONAL AIRLINES STRIKE ENDS	DMR 01-01-76 P.1,C.2
OLD CAPITOL	3 IOWA BUILDINGS NAMED U.S. HISTORIC LANDMARKS	DMR 01-20-76 P.3,C.2
PAINTINGS	2 PAINTINGS UNVEILED AT KEOKUK	DMR 10-24-75 P.6,C.4
POLICE	POT THIEF CAN'T RESIST BAIT, DIES IN POLICE TRAP	DMR 01-21-76 P.1,C.4
POT- -SEE 'MARIJUANA'		
RAILROAD PASSENGERS-WESTERN ASS	IOWAN LEADS DRIVE TO REVIVE TRAIN SERVICE TO WEST COAST	DMR 09-28-75 P.5,C.6
SASQUATCH	ELUSIVE LOCKRIDGE MONSTER HAUNTS TURKEY CREEK	DMR 11-21-75 P.1,C.1
SMITH,JAMES	SMITH, MARTIN CLASH OVER OFFICE IN WASHINGTON FOR DOT	DMR 12-20-75 P.8,C.2
STAINED GLASS CHURCH WINDOWS	STAINED GLASS WINDOWS STOLEN FROM CHURCH	DMR 01-12-76 P.1,C.2
STRIKE-NATIONAL AIRLINES	NATIONAL AIRLINES STRIKE ENDS	DMR 01-01-76 P.1,C.2
TRAIN SERVICE	IOWAN LEADS DRIVE TO REVIVE TRAIN SERVICE TO WEST COAST	DMR 09-28-75 P.5,C.6
TREE RING	RECENT TREE RING CALIBRATIONS PROVIDE AN INDEX TO ACCURACY OF C-1	DMR 01-23-76 P.9,C.5
TURKEY CREEK	ELUSIVE LOCKRIDGE MONSTER HAUNTS TURKEY CREEK	DMR 11-21-75 P.1,C.1
UFO'S	FAA: NONSENSE TO BERMUDA TRIANGLE	DMR 10-23-75 P.9,C.6
UFO'S	SEE'S UFO'S LINKED TO CATTLE MUTILATIONS	DMR 01-15-76 P.2,C.4
UNIFIED FIELD THEORY	PHYSICS AND THE LEFT-HAND OF LIFE	DMR 11-21-75 P.3,C.5
UNIVERSITY- -SEE ALSO 'COLLEGE','IOWA STATE UNIV','UNIV OF IOWA'		
VAN ALLEN AND SON CLINTON	3 IOWA BUILDINGS NAMED U.S. HISTORIC LANDMARKS	DMR 01-20-76 P.3,C.2
WASHINGTON	SMITH, MARTIN CLASH OVER OFFICE IN WASHINGTON FOR DOT	DMR 12-20-75 P.8,C.2
WESTERN ASSOCIATION OF RAILROAD	IOWAN LEADS DRIVE TO REVIVE TRAIN SERVICE TO WEST COAST	DMR 09-28-75 P.5,C.6
WHEAT,JOHN	2 PAINTINGS UNVEILED AT KEOKUK	DMR 10-24-75 P.6,C.4

Fig. 2. Sample Computer-Produced Output.

In summary, the salient features of the newspaper indexing algorithm include:

1. streamlined data preparation procedures;
2. the manual descriptor selection mechanism, which provides vocabulary control, precoordination of terms, word regularization, and reduction of subject scatter through the use of cross-references; and
3. an exhaustivity of indexing depth accommodating the essential elements of newspaper journalism—the who, what, and where of a story.

COST

There is an acknowledged dearth of information concerning cost factors associated with computer-produced keyword indexes, and the available information in the literature is often misleading and unrealistic. These reported costs often reflect contract charges with software firms or inflated machine costs charged by commercial computing services. Campey, in a survey of operational machine indexing software, quotes vendor and manufacturing prices for available preprogrammed packages as ranging up to $15,000.[18] These high start-up costs, along with the risks involved in adapting software from another installation, are discouraging to the neophyte in the field. Librarians, along with other social scientists, are increasingly utilizing personally written software procedures as a tool in the practice of their craft. Benefits in cost savings and quality control of the format of the file were realized in the application reported here because the programming routines were created and implemented by a member of the library reference staff.

In a study of the cost components associated with computer-produced indexes, Campey identified indexing method, data preparation, and machine costs as the generic cost factors.[19] Using a 600-item data base of monographs and journal articles, Campey reported that the machine costs of a batch index comprised between 13 percent and 25 percent of the total cost of generating a KWOC index (the percentage varying with type of keyword selection method). Adopting the time and cost standards for indexing, coding, and keypunching used by Campey, with the machine costs incurred in a production run of 600 *Des Moines Register* newspaper articles generating 1,800 single-line entries, it was found that the machine cost component of the aggregate production cost was less than 1 percent, approximately .08 percent of the total cost. In Campey's study, the machine costs appear to be higher than the machine costs associated with the newspaper index model presented here by a factor of 15–20. Because an individual newspaper article can be indexed in less time than a single book or journal report, the corresponding percentage of the total cost arising from indexer costs in a production run of the *Des Moines Register* index is reduced and the machine cost component is raised to approximately 3 percent of the total cost.

The computer charges, including run time and paper, for the biweekly production runs of approximately 110 articles, yielding approximately 315 subject entries, averages $1.15, amounting to $2.30 per month. A validation routine flags the improperly coded or ordered records and writes them onto a separate output file for later recoding and entry in the next biweekly run. The quarterly cumulations cost approximately $3.00 to produce. The total machine cost outlay for the twenty biweekly indexes, the three quarterly updates, and the annual cumulation amounts to approximately $48.00 per year. In the future, cumulations of longer time periods will utilize COM files.

A yearly cost breakdown covering staff salary and machine costs of the computer-generated index includes the following items:

Indexer salary	$435.00
Keypuncher salary	$310.00
Computer costs	$ 48.00
Miscellaneous	$120.00
Total	$913.00

Because the library is committed to producing a newspaper index of some type, a primary concern was with a time and cost comparison between the card file index and the computer-produced index.

Examination of the components associated with each mode of indexing revealed that the time involved in indexing and data preparation is approximately the same for both indexing procedures and that the machine cost involved with the computer-organized index is the only added factor. The algorithmic approach of selecting textual term descriptors used in the machine-produced index allows the selection of multiple access points in the same time frame required for the single-entry indexing scheme. The total time devoted to indexing and coding is approximately 100 minutes a week. An additional two hours per month is needed for miscellaneous tasks associated with batch processing and monitoring the input and output of the file.

In single-entry card files or in a newspaper clippings file, where the single subject entry problem is the major drawback, selecting the descriptor entails consulting a thesaurus or searching file drawers for precedent entries. Card file systems allowing the indexer to include articles under more than one heading create additional labor in recording and filing. If the entries are typed onto cards, the amount of typing necessary for multi-entry articles exceeds the required amount of keypunching for the entry in the mechanized system. The keypunching from the worksheets is not of the type requiring a trained keypuncher, but can be accomplished by a typist in less than three hours per week. In the former card file system, a comparable amount of time was spent writing the descriptor onto the newspaper and entering the descriptor on cards to be filed—the last two tasks done by clerical staff.

CONCLUSION

In situations where libraries are producing in-house newspaper indexes, the conversion to a computer-generated index is cost competitive, in addition to being more functional from a retrieval standpoint. The time involved in input procedures (indexing, coding, keypunching) is equivalent to the time required for data preparation in the manual file, and the additional machine cost factor is insignificant.

There are other segments of library collections in which the customized machine indexing procedure described in this paper could replace manually produced local indexes, e.g., vertical files, archives and manuscript holdings, international and state documents, map collections, new title listings, and specialized subject bibliographies. Projects addressing themselves to these areas are currently being pursued at the Iowa State University Library.

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In Memoriam—A Tribute to Ann

Ann T. Curran died on January 8, 1977, leaving behind a contribution to her profession and a host of friends.

Ann was born and educated in the Boston area. She attended Girls High School, Emmanuel College, and later Simmons College, from which she received her MSLS degree.

Since July 1974, Ann was assistant to the director for systems development and data processing, Boston Public Library, with responsibility for MARC processing. She was on the staff of the Countway Library when she first became involved with library automation. Involvement included serving on the American National Standards Institute (ANSI) Z39 Subcommittee 2, charged with establishment of a standard format for bibliographic information interchange. As a result of her interest and expertise, she was named by Z39 principal investigator of the study to determine the data elements required for the various agencies responsible for bibliographic control. The study resulted in the report *The Identification of Data Elements in Bibliographic Records,* by Ann T. Curran and Henriette D. Avram, and later served as one of the basic documents which led to the American National Standard Format for Bibliographic Information Interchange on Magnetic Tape (ANSI Z39.2-1971).

Upon completion of this study, Ann joined the staff of Inforonics, Inc., where she was closely associated with the New England Library Information Network (NELINET). She also served as consultant to the MARC Development Office, Library of Congress.

Her most recent contribution to library automation was as chairman of the Working Party on Bibliographic Name Authority Files under the Committee for the Coordination of Bibliographic Control. She was forced to resign her chairmanship because of illness.

Those of us who knew Ann will always think of her in the pastel colors she loved to wear and remember her sparkling brown eyes. Both her substantive contributions to her profession and her endearing personality will be missed.

Henriette D. Avram

Maximizing the Cost-Effectiveness of a Computer-Based Catalog Support System

Gordon D. MILLER: Price Waterhouse Associates (formerly at Carleton University Library); and Carrol IRELAND: Carleton University Library.

High levels of inflation and drastic cuts in library budgets demand careful planning and effective management control in all aspects of library operations. New and existing library systems must use all resources efficiently—particularly staff. This paper deals with existing systems and with improvements in their cost-effectiveness. For example, by adapting the organization and procedures to make more efficient use of existing resources and technology, the cataloging department's productivity and the quality of catalogs can be improved. It will be shown how small changes to an existing computer-based catalog support system can facilitate an entirely new approach to catalog control.

INTRODUCTION

Shelflist conversions are frequently conducted as part of the development of an automated circulation control system. The costs are usually accounted for as circulation system development costs, and after the book cards are produced and inserted into the books, the converted records are quietly forgotten.

Sometimes a machine-readable shelflist is constructed from the converted data, and then it becomes a "sacred cow," which places a severe strain on the cataloging budget while providing few, if any, operational benefits. It can, however, provide substantial benefits to a library that is organized and equipped to use it effectively. Moreover, it can be maintained without an increase in the library's operating costs, and many of the derived reports can be produced by library staff with little or no support from computer programmers.

BACKGROUND

Carleton University has some 16,000 full- and part-time students. The library has always been heavily used, with annual circulation approaching half a million items. The collection consists of nearly 600,000 monographs; including serials, documents, microfilms, and other materials, the collection amounts to over one million items.

Prior to its shelflist conversion, the Carleton University library had set up a computer-based catalog card production system. This was an ideal launching point for a shelflist conversion because the staff were already experienced with computer-supported systems, and the on-line data entry software and procedures were well tested.

The catalog card production system was one component of the catalog support system, which also produced accession reports and the Canadian Union Catalogue submittal. The Carleton MARC (CMARC) records were stored in a chronological file on magnetic tapes. The main objectives of the system were to expedite card production and reduce the staff levels in this function. These objectives were met and the library moved on to the next labor-intensive area—circulation control.

The library decided to implement a circulation control system based on optical scanning of an accession number. This approach would have provided only an absence file consisting of accession numbers unless an index or item file furnishing descriptive bibliographic data was also created.[1] Carleton University undertook to provide proper descriptive data and therefore the shelflist was converted.

APPROACH TO A SOLUTION

Organizational problems in cataloging and the requirement for an accession number index were investigated in parallel, and the following solution was proposed:

- Create a machine-readable shelflist (MARSL) from the shelflist conversion data.
- Maintain the machine-readable shelflist automatically, using the data prepared for the catalog card production system.
- Automatically derive the accession number index from the MARSL.

The proposed approach required the proper coding of holdings and their locations in each CMARC record. This increased the clerical complexities of the catalogers' work, and required that catalogers understand not only the maintenance principles for a network of manual files but also the computer file requirements that could not be made entirely transparent.

Work simplification became an obvious requirement. Increasing clerical complexity in cataloging would further decrease productivity. Staff turnover was another factor that demanded maximum simplicity. The only feasible approach was to develop a new organization in cataloging, with clearly defined functions and responsibility areas. The features of the new organization were:

- elimination of all aspects of catalog maintenance from the catalogers' duties (i.e., all revisions and recataloging); and
- creation of a small, specialized catalog control and maintenance group with extensive training in diagnosing and correcting catalog problems to assume responsibility for revisions and recataloging.

The catalog control function was placed in the hands of a small, well-trained, and more effective group. No longer would the control of the library's bibliographic resources depend on the application of complex procedures by a large number of people. The implementation of a machine-readable shelflist (MARSL) thus became feasible.

The new functional organization, including a small group of specialists in file maintenance, could easily adapt to and cope with computer files. In retrospect it was also found that the new catalog control group worked much more effectively as a result of having a MARSL available to them.

SYSTEM CONCEPTS

To support a new cataloging and catalog control organization and to maintain the MARSL, the old catalog support system had to be upgraded. The functions of the original system were:

- on-line data entry,
- catalog card production,
- accessions notification,
- Canadian Union Catalogue and serial titles submittals, and
- archival data storage (CMARC Archive).

These functions are outlined in the flow chart in Figure 1. In its original form, the catalog support system was able to process the shelflist conversion and the data were stored in the CMARC Archive format.

To support the new organization and the MARSL requirement, the system had to be upgraded to:

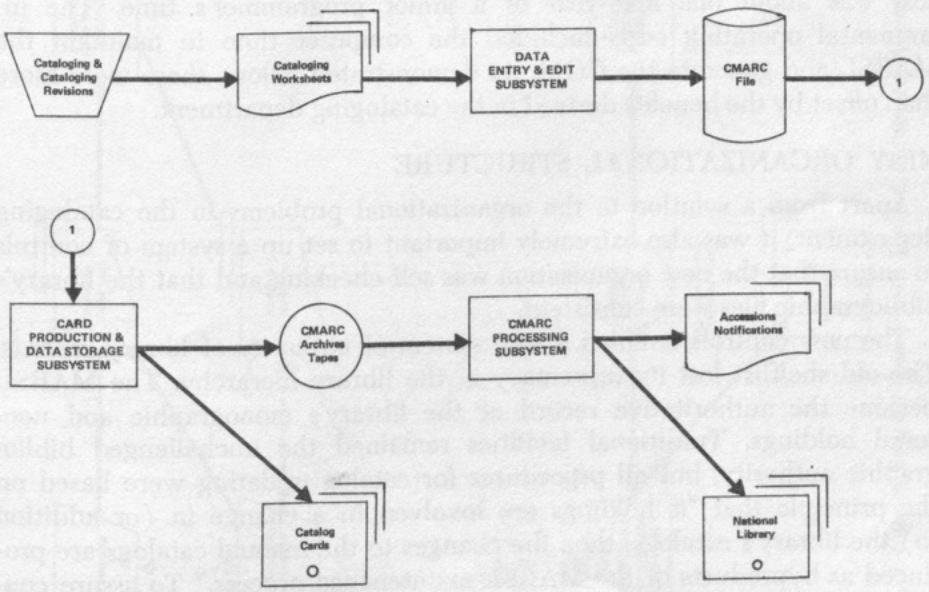


Fig. 1. Initial Catalog Support System.

- generate MARSL maintenance records (transactions) automatically from CMARC Archive data,
- update the MARSL, and
- maintain the accession number index.

The addition of these functions to the catalog support system is illustrated in Figure 2. The only change to the existing system was the addition of a new output (a set of transactions for updating the MARSL) in the CMARC processing subsystem. Figure 2 also shows a new MARSL processing subsystem with four main components:

- a MARSL update program,
- a program to produce a listing of the MARSL on computer output microfiche (COM),
- a program to produce printed COM/MARSL supplements, and
- a program to maintain the accession number index.

Access to the MARSL is provided using COM (produced bimonthly) with weekly paper supplements.

Some compromises had to be made in the design to employ existing computer software. Only one junior programmer was available to maintain the catalog support system and implement the new modules. The results were satisfactory except for the fact that some of the data-processing logistics (tape handling and controls) were cumbersome. The input-output controls at the library end, however, were simple and effective.

The development costs of the computer processing elements of the new catalog support system were small. The technical design was accounted for in the capital cost of the circulation control system. The implementation cost was about one man-year of a junior programmer's time. The incremental operating costs included the computer time to maintain the MARSL and generate the COM. As demonstrated below, these were more than offset by the benefits derived in the cataloging department.

NEW ORGANIZATIONAL STRUCTURE

Apart from a solution to the organizational problems in the cataloging department, it was also extremely important to set up a system of controls to ensure that the new organization was self-checking and that the library's bibliographic files were consistent.

The new controls entailed a new system of authority of library records. The old shelflist lost its supremacy in the library hierarchy. The MARSL became the authoritative record of the library's monographic and nonserial holdings. Traditional facilities remained the unchallenged bibliographic authority, but all procedures for catalog updating were based on the principle that "if holdings are involved in a change in (or addition to) the library's catalogs, then the changes to the manual catalogs are produced as byproducts of the MARSL maintenance process." To assure conformance with this principle all manual typing or handwriting in the

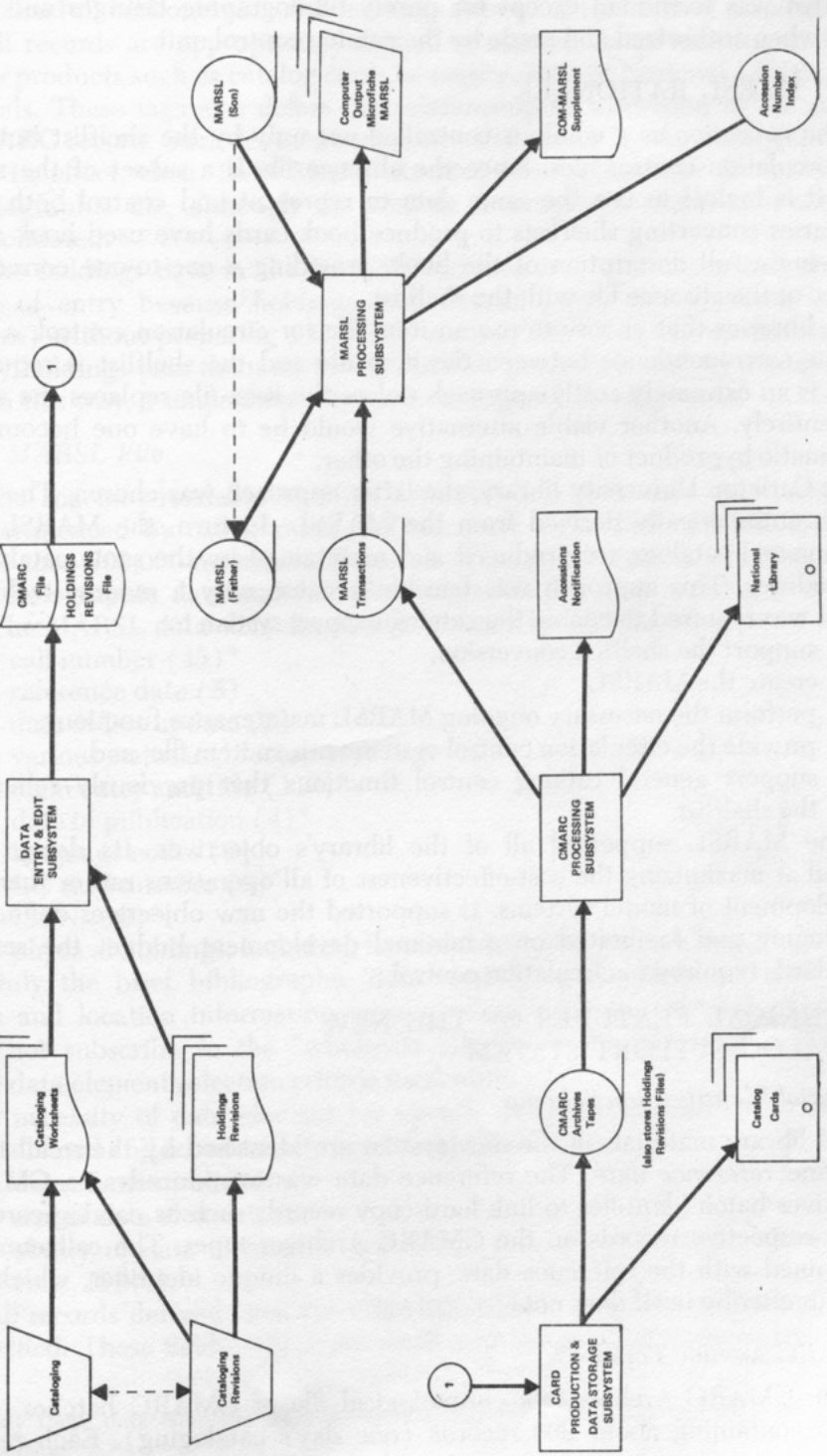


Fig. 2. Catalog Support System with MARSL Subsystem Added.

shelflist was forbidden except for purely bibliographic changes and then only when authorized and made by the catalog control unit.

THE MARSL RATIONALE

The collection as a whole is controlled not only by the shelflist but also by circulation control files. Since the absence file is a subset of the shelflist, it is logical to use the same data to represent and control both files. Libraries converting shelflists to produce book cards have used book cards carrying a full description of the book, providing a one-to-one correspondence of the absence file with the shelflist.

In libraries that choose to use an item file for circulation control, a one-to-one correspondence between the item file and the shelflist is required. This is an extremely costly approach unless the item file replaces the shelflist entirely. Another viable alternative would be to have one become an automatic byproduct of maintaining the other.

At Carleton University library, the latter approach was chosen. The item file is automatically derived from the MARSL. In turn, the MARSL and the manual catalogs are produced and maintained by the same cataloging procedures. This approach was feasible because only a modest technical effort was required to enable the catalog support system to:

1. support the shelflist conversion,
2. create the MARSL,
3. perform the necessary ongoing MARSL maintenance functions,
4. provide the circulation control system with an item file, and
5. support general catalog control functions that previously relied on the shelflist.

The MARSL supported all of the library's objectives. Its design was aimed at maximizing the cost-effectiveness of all operations rather than the development of model systems. It supported the new objectives defined in cataloging and facilitated on a minimal development budget the service standards required in circulation control.

TECHNICAL FEATURES OF THE NEW CATALOG SUPPORT SYSTEM

Material Identification Scheme

All library materials in the new system are identified by their call number and *reference date*. The reference date was introduced as a CMARC Archives batch identifier to link hard-copy records such as catalog cards to their respective records on the CMARC Archives tapes. The call number, combined with the reference date, provides a unique identifier, which the call number by itself does not.

CMARC Archive Tapes

The CMARC Archive is a chronological file of CMARC batches, each batch containing about 200 records (one day's cataloging). Each record

contains full bibliographic and holdings data *as of the date of cataloging.*

All records are appropriately tagged to control the production of hard-copy products such as catalog cards, accession lists, or National Library submittals. These tags also define the relationship of a revision to the parent CMARC record. Such revisions reference the parent by date and call number. In effect, then, the CMARC Archive tapes constitute an up-to-date bibliographic file, although the records describing a single title are not consolidated.

The holdings data in the CMARC Archive are meaningful only on the date of entry because holdings may change (e.g., continuations, added copies) without preparing a CMARC record. The CMARC records that do carry holdings pass them on to the MARSL processing system automatically. In this way, a single data entry process supports both systems.

The MARSL File

The machine-readable shelflist (MARSL) is a consecutive computer file sequenced by call number and reference date. The MARSL includes more than 700,000 records on five reels of magnetic tape. It contains limited bibliographic data and full physical holdings for all cataloged material. The MARSL data elements and their character lengths are:

- call number (45)*
- reference date (5)
- date of last update (5)
- various status and record type tags (20)
- main entry and title (110)*
- date of publication (4)*
- language codes (9)
- LC card number (8)*
- ISBN (10)*
- physical holdings, including location identifiers (30 per item)*

Only the brief bibliographic data identifying the item and full holdings and location information were converted for the MARSL. Carleton did not subscribe to the "wholesale conversion for posterity" approach. The data element selection criteria used were:

- necessity of data element for already designed systems or for clearly defined and economically feasible MARSL byproducts,
- data element reliability,
- size of data element, and
- ability of data element to serve as a link to authoritative data bases (e.g., ISBN).

All records derived from the CMARC Archive carry the additional fields specified. These fields, which are small and inexpensive to maintain, facili-

* Only these data elements were considered cost-justifiable and necessary for shelflist conversion.

tate analyses of collection development and cataloging statistics since 1971.

There is a one-to-one correspondence between the MARSL and the manual shelflist, but eventually the holdings will be dropped from the manual shelflist. The manual holdings records are costly to maintain and are redundant because the MARSL is the authoritative record.

The maintenance of the MARSL is straightforward. New records or changes to existing ones are transcribed to worksheets. The rest is done by the computer based on the record status and type tags. These tags control the computer processing of additions, deletions, and changes.

Computer Output Microfiche

The MARSL can replace the manual shelflist for collection control purposes only if an inexpensive, simple, fast, and reliable means of access is available. Computer output microfiche (COM) meets these requirements.

The COM is a single-line-per-volume listing of the MARSL. The data included are the call number, reference date, publication date, and truncated author-title and volume-copy-location identifiers. The compactness and ease of use of this single-line format outweighed any benefits that could be derived from additional data in a multiline format.

The cost of producing the COM is about $750, of which $600 is accounted for by computer processing of the MARSL. The other $150 is the COM service bureau charge. After the master COM is produced, copies of the entire shelflist, priced at $10 each, can be distributed widely.

The COM with its weekly printed supplement is current and not subject to unauthorized changes or the "temporary" removal of records. There are no problems with the one-week time-lag between the preparation of a change and its entry in the supplement, mainly because the same title is seldom reprocessed in the same week.

The scheduling of COM production can be varied. The interval is determined by the rate of growth of the printed supplement and is typically two to three months. It is not produced on a weekly or monthly basis chiefly because it is desirable to minimize the costs of MARSL updating. The supplement does not require a MARSL update because it is produced directly from MARSL transactions. These are derived from the CMARC Archive tape each week and merged with those from prior weeks on the accumulated MARSL transactions tapes (see Figure 2).

THE NEW CATALOGING SYSTEM AND PROCEDURES

Objectives

The new cataloging department organization, established after a thorough review of the overall requirements, was more functional in structure than the previous organization. It improved the productivity and control of the processing, and provided a better working environment.

The new catalog support system and the organization combined to form

a new cataloging system in which each element of the new system to some degree supported at least one other element or function. Just as the catalog control group was an essential element in the overall MARSL maintenance function, the COM MARSL was a prerequisite for carrying out cataloging revisions.

The Old System

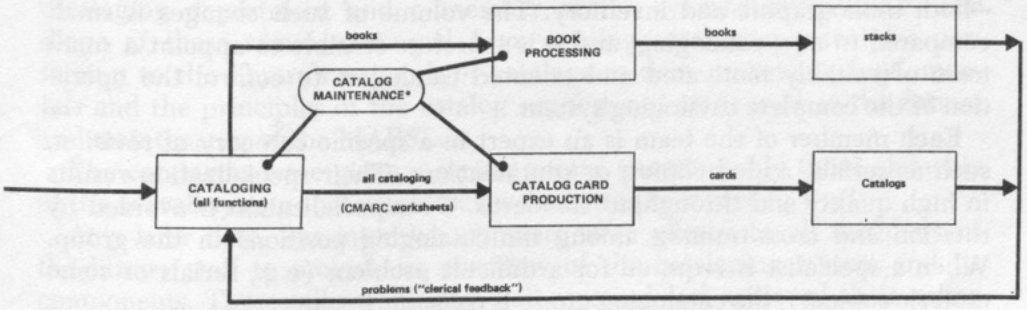
The cataloging department was originally set up in three sections: searching, cataloging, and end processing. The system flow that resulted is shown in Figure 3. The catalog maintenance group evolved out of the cataloging and book processing functions.

Cataloging was originally subdivided into subject teams, with each team responsible for all aspects of cataloging and catalog maintenance. This required that every cataloger not only understand all aspects of catalog maintenance and control but also participate in all related functions. The result was a lack of uniformity in the interpretation and administration of cataloging policies and rules.

This approach created a department where no one person was fully knowledgeable in the requirements of all files and categories of revisions. Catalogers, who only occasionally processed revisions, could not be expected to remember the many rules and detailed relationships among the catalogs and files. For revisions to be made and the relations and links between files and catalogs to be maintained, it would be necessary to have a specialist and expert in this function. The addition of the MARSL compounded this requirement.

The New System

The new cataloging organization splits the overall cataloging operation into two functional units, one concerned primarily with pure cataloging in the bibliographic sense, and the other responsible for maintaining ef-



* includes some cataloging and some processing functions but no clear terms of reference

Fig. 3. The Original Cataloging System Flow.

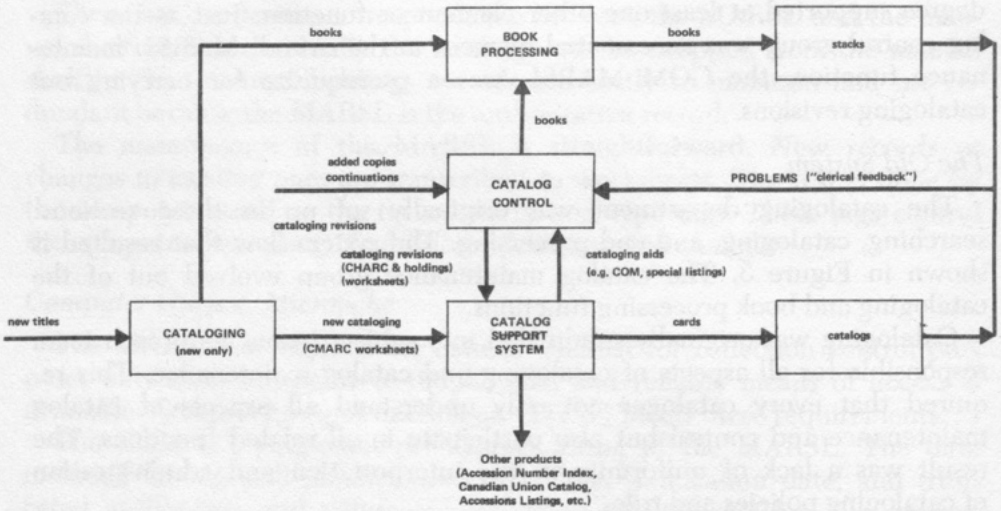


Fig. 4. The New Cataloging System Flow.

fective control of all cataloging records and files on all media.

An integral part of the new system is the catalog support system, which, combined with the new cataloging department structure, results in the overall system flow illustrated in Figure 4. In contrast with the flow in Figure 3, the new flow divides the responsibilities of cataloging and catalog control.

The new cataloging group is responsible for all new original and derived cataloging, and is now only a user of the catalogs. The catalogers in this group are *not* permitted to make revisions. They submit their requests to the catalog control group in accordance with clearly defined procedures, relieving them of clerical tasks that they should not have been performing in the first place.

The catalog control unit is responsible for ensuring that all cataloging files are consistent and up to date, and that they correctly reflect the library's holdings. This entails full responsibility for all cataloging revisions —both bibliographic and inventory. The volume of such changes is small compared to new cataloging, and it is therefore feasible to appoint a small team of suitably motivated and talented catalogers to control the operation of the complete cataloging system.

Each member of the team is an expert in a specific category of revision, such as serials, added copies, or continuations. Their specialization results in high quality and throughput standards. Overspecialization is avoided by rotation and cross-training among the cataloging positions in the group. When a specialist is required for a difficult problem (e.g., serials or some esoteric subject), the cataloging group is consulted.

An important component of the catalog control group is the clerical and typing staff who carry out a large part of the related work. These people

are now employed much more effectively than with the previous system, and they perform better under a single cataloger, the catalog control section head. The clerical staff perform many tasks related to revisions and recataloging that were previously done by catalogers.

The head of the catalog control group, who is thoroughly familiar with all aspects of the library's cataloging and data processing systems, maintains effective communications with the cataloging section head. The head of catalog control must possess the ability to manage staff effectively, to detect and diagnose cataloging problems of all kinds, and to propose and implement solutions.

While the benefits of the functional subdivision of cataloging operations could be derived in a completely manual environment, they are essential for cost-effective computer-supported operations. These benefits are realized primarily by relieving catalogers of the clerical tasks that impede productivity. A comparison between Figures 3 and 4 shows how the "clerical feedback" path to cataloging is eliminated.

Implementation Approach

The new organization and structure in the cataloging department was developed primarily by one systems analyst who had extensive cataloging experience. She worked closely with the designers of the cataloging support system and with the head of the existing catalog maintenance group. Frequent meetings with cataloging specialists, such as the serials catalogers, were held to ensure the viability of the system design as well as maximum participation by the catalogers. As found previously, this approach fostered the creation of an environment hospitable to such change.[2]

In spite of a concerted effort to keep the catalogers informed, some viewed the increased responsibility of the new catalog control group as a threat to their autonomy. However, their misgivings and misconceptions were eventually overcome.

When the procedures manual had been written and the first COM MARSL had been produced, the catalog control staff attended intensive training seminars conducted jointly by an experienced cataloger from the cataloging department and a member of the systems department. The scope of those seminars ranged from existing cataloging principles pertaining to the library's network of catalogs to data processing fundamentals and the principles of the catalog support system as well as the format and maintenance of the MARSL.

The catalogers were given a similar course stressing only those elements of the overall system that would be necessary to them in their work.

At a later date, less intensive seminars were offered to all members of the library staff to provide an overview of the cataloging system and its components. These talks were very well received and achieved their prime objective, namely to sell the idea of a more rigorously controlled and centralized revisions policy.

The Cataloging System Flow

All cataloging functions produce two kinds of cataloging worksheet:

- the CMARC worksheet, for the full bibliographic description of the title and holdings, and
- the holdings revision worksheet, for describing changes in physical holdings.

Cataloging worksheets are used for bibliographic changes. These changes are processed via the card production and CMARC processing subsystems (Figure 2). Holdings revision worksheets are used for holdings changes only (i.e., added copies, continuations, deletions, discards, etc.); these worksheets bypass all subsystems except MARSL processing.

All catalog maintenance and control functions are based on the principle that *a cataloging (CMARC) worksheet or a holdings revision worksheet is the last document that is handwritten* (Figure 2). The worksheets are then batched and keyed on the data entry subsystem. All computer files are automatically updated and new or changed catalog cards are computer generated to maintain one-to-one correspondence. Normally only one worksheet is required for a specific cataloging operation; in exceptional cases where there are several hundred volumes or copies, a holdings revision worksheet can be used to supplement a CMARC worksheet.

The system flow is controlled by batching procedures that include counting and logging of counts at each step. For example, in the catalog support system illustration in Figure 2, input totals are reconciled with output statistics at each step. The data entry group carries out these checks for the computer-processing steps, while the catalog control group monitors the overall system operation from worksheets to catalog cards and MARSL updating.

The flow of physical materials is illustrated by Figure 4. Any new arrival is channeled to cataloging or catalog control on the basis of whether or not it is a new title. Any other tasks arising out of a discovery of errors in the catalogs or in the stacks are all channeled to catalog control. In actual practice, catalog control makes most of these discoveries itself.

Record Consistency Factors

The problem of maintaining proper and consistent relationships between records in different locations and on different media was the chief reason for developing the new system.

Overall control of record consistency can be assured only through adequate training and good supervision. When these measures are in force the procedural controls will have a chance to work.

The fundamental control in the cataloging system is source document control, which is achieved through batching and logging at each step. This approach would be entirely defeated if "small changes" were permitted to be made informally or manually. Hence, all types of errors or requests for cataloging revisions must be documented precisely on a worksheet. This

document becomes the sole authority for any alteration to any computer or manual record in the system.

The COM listing of the MARSL is the authoritative holdings record and it is used exclusively in the handling of all added copies, continuations, and discards. For all bibliographic revisions, the descriptive cataloging is performed first, and as the final step the COM is consulted and the inventory for that title is checked. Holdings are entered on the CMARC worksheet as required.

Items recently processed but not yet appearing in the COM supplement do not present any problems. The work has been distributed in such a way that all revisions are channeled to a specific individual. Hence, if the revision assistant recognizes that a previous revision which has been processed is not reflected on the COM, that person merely sets the item aside until the new supplement arrives.

Some minor bibliographic revisions do not affect the MARSL and can be made manually. Still, a worksheet is prepared by the revisions cataloger before the clerical staff update all manual records. The worksheet is then sent for data entry, but in this case no catalog cards are generated. When a new card set is required, the worksheet goes directly to data entry and the new card set "bumps" the old one.

Technical control over card sets and the maintenance of machine files is accomplished through the use of special production control tags. The cataloging group uses only one tag—"new." The revisions catalogers in the catalog control group are thoroughly trained in the use of the full control tag set. Whenever a subject specialist is called upon to assist with a difficult recataloging problem, the cataloger completes the bibliographic section of the CMARC worksheet and the catalog control cataloger fills in the control section. This approach keeps the overall control of the system in the hands of a small and well-trained team.

System Benefits

A catalog support system featuring a machine-readable shelflist of authoritative quality has many advantages. Traditional functions are carried out with greater ease, and many hitherto unfeasible projects and tasks may now be supported.

In assessing the feasibility of some cataloging projects, a shelflist sample must be selected and studied. In many instances, it is now possible to analyze the whole collection at a fraction of the previous cost by using file management software packages that are now readily available on almost all computer systems.

The speed of access and the portability of the COM contribute to significant improvements in shelflist searching. The COM access time is three to five times faster (a conservative figure) than that for a manual shelflist. The time and motion costs in many cataloging tasks are reduced sig-

nificantly because the tasks can be performed without the cataloger leaving his or her desk.

A less direct but very real byproduct of a system with a well-controlled MARSL is the emergence of substantially improved public card catalogs. To make the system work at all, quality-control standards must be high and adequate provisions must be made to detect and diagnose conflicting cataloging rules and policies as well as other kinds of cataloging problems.

Among the reasons why Carleton University considered a MARSL in the first place was the need for a system that facilitated the assignment *and maintenance* of book numbers (accession numbers). Because Carleton decided to use the Plessey Light Pen for circulation control, it required a numeric book identifier that linked copies of a bibliographic entity. An accession number index, as described earlier, had to be created and maintained to support the requirements for bibliographic data in the circulation files. The MARSL provides for the maintenance of the book numbers, and by inverting the MARSL the required accession number index is provided automatically.

The actual labeling of the books was supported by the COM MARSL. This project was a massive inventory and reconciliation of cataloging problems as well as a labeling project. With a manual shelflist it could never have been done, but with hard-copy listings and about a half-dozen copies of the COM MARSL, the project was conducted quickly and effectively. It turned out to be the largest and most successful cataloging project undertaken at Carleton in recent years, if not ever.

More exciting possibilities, whose cost would previously have been prohibitive, can now be considered. Collection analyses are reduced to the problem of defining what one wants to know (admittedly a large task). Printed bibliographies are easily produced, and despite their limited content, they could be very useful and well received by library users. It is also possible to do retrospective accessioning and cataloging analyses. These are all made feasible because of the retrieval and reporting software packages which are now available and which can be operated by library staff.

The MARSL is a flexible and simple-to-use tool, certain to yield additional benefits in response to emerging needs.

CONCLUSION

The objective has been to maximize the cost-effectiveness in an already automated library cataloging environment. This has been achieved through increasing the benefits derived from existing resources and systems without a corresponding increase in costs.

The major costs of developing the MARSL subsystem of the catalog support system would have been incurred even if the MARSL itself had not been a specific objective. Shelflist conversion was necessary to support the development of a circulation control system, so the benefits derived from this costly project were significantly increased. The costs of setting

up data entry and control procedures for conversion were not incurred because these already existed.*

The development of the MARSL, like so many library projects, lacks detailed cost figures. The major costs were the shelflist conversion, which was accounted for in the circulation system development, and the cataloging reorganization.

The cost of reorganizing cataloging was two man-years of effort in the library and an additional man-year related to computer operations and improving system controls. The computer charges, including those for processing the shelflist conversion, were under $10,000. In the context of the larger library objectives and project costs, these costs are modest.

More important are the ongoing operating costs, and these have not changed substantially. More benefits are being derived from the same resources. The catalog support system has been made more productive through the implementation of the MARSL, to the extent that one clerical position and one cataloging position were eliminated in the final cataloging/catalog control organization. In such a labor-intensive area, this increase in productivity more than offsets the cost of any additional computer usage (less than $5,000 per year).

On the effectiveness side, there has been an improvement in the condition of the catalog. The new cataloging and catalog control groups are better equipped to recognize and resolve bibliographic and inventory problems; filing, at last, is being kept up to date. The improved resources available have contributed to better working conditions and have improved morale. The catalogers have been relieved of much routine clerical work, and the clerical and typing staff are happier in the smaller and well-organized cataloging control group.

The cost-effectiveness of the catalog support system has been significantly improved. The benefits of the new system are numerous and there is potential for further gains and cost savings to be achieved when new development projects are undertaken.

ACKNOWLEDGMENTS

The authors are indebted to Florence Coleridge, who was a key figure in initiating the work described in this article. Her work on the original catalog support system was a vital factor in the success of subsequent developments.

REFERENCES

1. Rob McGee, "Two Types of Designs for On-Line Circulation Systems," *Journal of Library Automation* 5:184–202 (Sept. 1972).
2. David C. Weber, "Personnel Aspects of Library Automation," *Journal of Library Automation* 4:27–37 (March 1971).

* Data entry equipment had to be added for the duration of the project. This cost about $12,000.

Highlights of ISAD Board Meetings

ALA Midwinter Meeting 1977

January 31, 1977, 2-6 p.m.

The meeting was called to order by Joseph Rosenthal, President. The following were present: BOARD—George Abbott, Henriette Avram, Kandy Brandt, Maurice Freedman, Judith Hopkins, Lois Kershner, Susan Martin, Mary Jane Reed, Joseph Rosenthal, and Ruth Tighe. GUESTS—Barbara Gates, Rob McGee, and George Sullivan. STAFF—Donald Hammer, Executive Secretary, and Dorothy Butler, Administrative Secretary.

It was MOVED by Maurice Freedman and SECONDED by Ruth Tighe and

VOTED, That the 1976 Annual Conference Minutes of the ISAD Board Meetings be accepted as written.

Rob McGee reported that the Nominating Committee's nominees for Vice-President/President-Elect and Director-at-Large for the coming year are as follows:

ISAD Vice-President/President-Elect: Susan Martin, General Library, University of California, Berkeley, California; and Ruth Tighe, National Commission on Libraries and Information Science, Washington, D.C.; Director-at-Large: Jerome K. Miller, University of Illinois Graduate School of Library Science, Champaign, Illinois; and Donald J. Sager, Columbus, Ohio, Public Library. It was MOVED by Mr. Freedman and SECONDED by Ms. Tighe and

VOTED, That the Nominating Committee report be accepted as presented and the Committee be commended for the representativeness of the slate nominated.

VIDEO AND CABLE COMMUNICATIONS SECTION GRANT REQUESTS FOR A TELECOMMUNICATIONS REPRESENTATIVE. Kandy Brandt reported that VCCS's Legislation and Regulation Committee had twenty-three items requiring response to one governmental body or another and they have found it increasingly difficult to coordinate them, let alone inform people in the field.

VCCS is preparing a grant proposal with the cooperation of Eileen Cooke to seek funds to pay a librarian to act as the coordinator for the input and findings of the field on telecommunications legislation that is in existence and growing daily. Ms. Brandt had been told by Eileen Cooke that ALA could not fund this position in the Washington Office. VCCS is most concerned with FCC's rules, and needs to get information from localities and ensure that libraries will have access to channels of communication.

Ruth Tighe interjected that there are at least two provisions in the following bill now pending that could affect automation. The House Subcommittee on Communications is holding hearings on the AT&T recommendation that the interconnect control of a network be left to the states, which could create havoc in trying to create a telecommunications network across state lines.

Mr. Rosenthal suggested that VCCS continue working with Eileen Cooke informally and also continue to work on a formal proposal requesting funding.

In regard to the Telecommunications Committee as legislative "Watch Dog," Ms. Avram stated that in her opinion that item is very important and that somebody should be on top of it.

Mr. Rosenthal, feeling there was an area of consensus regarding responsibility being delegated to the Telecommunications Committee and that it should work with the Video and Cable Communications Section and also with Eileen Cooke's office in Washington, D.C., requested that this be expressed in a written motion.

Pending the submission of a worded resolution, the Board moved on to the next agenda item.

VCCS REPORT TO THE BOARD. All the VCCS committees are working on their function statements. The Legislation and Regulation Committee is being enlarged to allow more people to respond to legislation and to appear before groups. They are considering an update of the information packet being distributed by ISAD. An update of the Guidelines is also being planned by the VCCS Publications Committee. VCCS is also considering input on Project Mediabase. An update of the survey of the status of video and cable in libraries around the country is being done. Two hundred and ten questionnaires have been received from a total of 6,000 sent out. Because of the slow return VCCS is going to try a networking approach to get the information from the different regions. Ms. Martin expressed interest in publishing the survey of libraries in *JOLA*. Ms. Brandt was responsive to that idea as long as *JOLA* identifies the results as representing a small response. VCCS hopes to use the small response of this survey as a base for funding to do a more comprehensive study.

AUDIO-VISUAL SECTION REPORT—George Abbott. In the past within ALA there have been numerous committees in numerous divisions dealing with AV, and the AVS has for the first time provided a membership base for librarians interested in AV. AVS is now sorting out what those interests are and how they should be developed. AVS is trying to identify the concerns of other ALA units and set up working relations and informational exchange. Most of the efforts of the AVS have been programmatic in nature, and in addition to the regular annual program in Detroit the AVS is planning a preconference to be held prior to the Detroit Conference. The title of the preconference is "Implications and Utilization of Newer Media

Technology." The areas concerned are to be buildings, funding capabilities, new technology, and possible copyright legislation. During this Midwinter Meeting the AVS is sponsoring hearings on Project Mediabase, the NCLIS/AECT project which is posing a set of functional specifications for a national data base for nonprint media.

RTSD CATALOG CODE REVISION COMMITTEE REPORT—Barbara Gates. Ms. Gates summarized the history of the Joint Steering Committee and cataloging code development. At the first meeting of the ALA Catalog Code Revision Committee (CCRC) in July of 1975 in New York, a list of library associations and groups interested in the development of rules throughout the country was compiled. These groups were invited to assign liaisons to the committee so that CCRC could be apprised of their concerns.

The code will be divided into two parts. Part one will be the text of all the descriptive chapters, and part two will be the rules for choice of entry. Eleven chapters of part one have been completed. The ISAD Board of Directors has been assigned five copies, which are not to be loaned, copied, or otherwise distributed. Four of the five copies which ISAD was assigned are being sent to four people that Mr. Rosenthal assigned to review the code. The review copies, amounting to 500 photocopied pages, will be sent out not before January 15 and must be returned no later than March 15. The four people selected are Phyllis Richmond, Susan Collenbach, Eleanor Payne, and Eleanor Crary.

George Abbott voiced concern that the code did not address the technological differences between North America and Great Britain. The Board agreed after much discussion that they would like to at least look at the code. Because of the difficulty in reading the code, the Board decided that a person be appointed who is knowledgeable in cataloging to review the fifth copy. Mr. Freedman suggested that Ms. Brandt and Mr. Abbott caucus to select a person who they thought was qualified. After much discussion, Mr. Freedman was appointed a committee of one to come up with a draft charge so that the four selected reviewers would be able to ascertain what policies ISAD would like to see reflected in the code.

AFIPS MEMBERSHIP PROPOSAL—Henriette Avram. It was Ms. Avram's feeling that ISAD could benefit from affiliation with AFIPS by bringing in professional technicians. AFIPS offers two types of memberships: affiliate membership with participation as a non-voting member, and full membership. Ms. Avram was asked to write the AFIPS Admissions Committee chairman, Mr. Palmer, telling him of ISAD's interest in membership in AFIPS and asking him to give us information of the possible benefits to our own organization.

BYLAWS AND ORGANIZATION COMMITTEE REPORT—Lois Kershner. The Bylaws and Organization Committee recommends that the ISAD Board interpret the error in the Bylaws as a printing error and that

the galley form be accepted. They also recommend that a notice appear in *JOLA* to this effect. It was MOVED by Ms. Kershner and SECONDED and

VOTED, That the errors which occurred in the printing of the bylaws amendments as printed in the *Journal of Library Automation* 9:73–74 (March 1976) be ruled a printing error, that the galley form be accepted (noted below), and that a notice should be printed in *JOLA* to this effect. Error: Article IV, Section 3 (a) subsection is identified "(b)" Vice-President and Article IV, Section 3 (b) subsection is identified "(a)." Should read: Article IV, Section 3 (a) subsection identification "(a)" President Article IV, Section 3 (b) subsection identification "(b)."

The Bylaws and Organization Committee also proposed to the Board that the name of the division be changed to reflect the current interests of all the units of the division. One possible name the committee proposed was "Library Technology Association."

The committee did not try to reorganize the units of the division, but merely discussed a name change. The committee attempted to propose names which did not contain the word "division," although as an alternative the committee thought the word "division" was acceptable. It was pointed out by Mr. Hammer that since ALA has instructed the divisions to be independent, certain divisions are changing their names from "division" to "association," although they are still divisions of ALA. Ms. Tighe recommended "Information Technology" for a possible name for the division. Ms. Kershner pointed out to the Board that within the Bylaws and Organization Committee there was not a strong feeling for any particular name. They wanted to make a recommendation to the Board so that the Board would have a starting point from which to discuss the issue.

Regardless of the title, certain revisions would have to be made to the Bylaws. First, the name change would have to be reflected in the bylaws of the division; second, the object statement would have to be revised (the committee looked at the current object statement and revised it slightly); third, the committee looked at the bylaws of the two existing sections and merely substituted the words in the name statement as far as the Audio Visual Section was concerned. In Article III they needed to change the heading, but did not change the content. As far as the VCCS bylaws were concerned, they needed to change only the wording under the name. Finally, the committee recommended the creation of a new section to reflect the interests of the original division and to be named "Information Science and Automation Section." The committee also proposed the format for the bylaws of that section, and worked on articles I, II, and III, being the name, object, and relation to the division.

Ms. Martin suggested that the committee include "interlibrary coopera-

tion" in the object statement of the division. In fact, ISAD is concerned with the technology between libraries as well as within libraries. Mr. Hammer informed the Board that they can change the name of the division but a change in the charge to the division must be approved by ALA Council. Summarizing the Board's discussion, three names were discussed: Library Technology Division or Association; Information Technology Association or Division; and Information Science and Technology Division or Association.

Mr. Rosenthal asked the Bylaws and Organization Committee to bring back to the Board a first and second preference for a coupling of the name of the division with the name of the new section. There was a general consensus of the Board. Additionally, the committee was instructed to look organizationally at the committees. Mr. Freedman suggested that each section have its own program planning committee and that the division program planning committee be composed of the chairpersons of the different section planning committees.

EDITORIAL BOARD REPORT. Ms. Martin announced to the Board that she is resigning as editor of *JOLA*, effective in January 1978, in order to devote more time to a doctoral program. It was MOVED by Mr. Freedman and SECONDED by Ms. Tighe and

VOTED, That Susan K. Martin is to be commended for the outstanding job she has done as Editor of the *Journal of Library Automation*. The Information Science and Automation Division notes with regret Ms. Martin's resignation, and it wishes to express its deepest gratitude to her for the excellence she brought to ISAD's official publication.

The meeting was adjourned at 6:07 p.m.

February 3, 1977, 2-6 p.m.

The meeting was called to order by Joseph Rosenthal, President. The following were present: BOARD—George Abbott, Kandy Brandt, Maurice Freedman, Judith Hopkins, Lois Kershner, Susan Martin, Joseph Rosenthal, and Ruth L. Tighe. GUESTS—Margaret Cleland, Roberto Esteves, F. D. R. Fox, Charlie Husbands, John Kountz, Michael Malinconico, Louise Mortimer, Harold B. Schleifer, Donald Stewart, William J. Teachey, and Loreta Tiemann. STAFF—Donald Hammer, Executive Secretary, and Dorothy Butler, Administrative Secretary.

TESLA—John Kountz. The Technical Standards for Library Automation Committee has been working on four standards proposals. The committee does not make standards but can articulate standards requirements and place the articulation in such a way that it can be handed off to a standards-making body. Three of the standards proposals are suitable for transfer to ANSI Z39. Specifically, these are item identification, site identification, and patron identification, primarily to be used for circulation control. These

standards proposals are anticipated to be released around the end of February. Concurrently a brief article will be made available to the *Journal of Library Automation*. Mr. Kountz informed the Board that these are simply proposals and it will be about two or three years before they become standards. He asked the Board to recommend that *JOLA* publish the preliminary proposals and also endorse them. Mr. Rosenthal felt that it is premature for the Board to endorse the proposals. Ms. Tighe asked whether the Board would like to receive copies of the proposals. It was the consensus of the Board that they receive copies of the proposals before they take any formal action of endorsing them. Mr. Hammer also suggested that the ALA Standards Committee receive a courtesy copy of the proposals.

Additionally, Mr. Kountz reported that TESLA does have a fourth standards proposal, which is for labeling business and data processing machines as to the amount and quality of sound or noise emitted by them. This proposal has been circulated to the committee, to the Computer and Business Equipment Manufacturers Association, and also to the American National Standards Institute Committee S1. CBEMA is currently very active in the area of product acoustics. Mr. Bob Brown, chairman of CBEMA, his associate, Mr. Hannoran, and Mr. Dan Flint, chairman of ANSI S1, attended the Monday afternoon meeting of TESLA and they welcomed the input from a user group regarding a means by which to label equipment. It was indicated by Mr. Brown that they would welcome a representative from the library user group on their technical committee. Mr. Kountz therefore asked the Board to consider the endorsement or sponsorship of a member of TESLA to work on the technical committee #6 of the Computer and Business Equipment Manufacturers Association.

After much discussion, the Board instructed Mr. Kountz to have his CBEMA contact write to either Mr. Hammer or Mr. Rosenthal formally inviting us to participate and stating the conditions of such a liaison.

EDITORIAL BOARD—Susan Martin. The Editorial Board received a report from Bill Scholz, advertising editor, stating that his objective for the June issue was to make the same gross income for that issue as had been made for the entire volume the previous year. He has not yet achieved this goal, but income is considerably up from where it was. He predicts that by the September issue we will have exceeded last year's gross. With the June issue, Mr. Scholz would like to change the mix of advertisers by bringing in audiovisual, hardware, and software suppliers. Because of the small advertising budget, Mr. Scholz suggested that it might be worthwhile to return 25 percent of the gross to the advertising budget for postage, flyers, etc., for a limited time. Last year the gross revenue was $1,300 and this year if it keeps on going at the current rate the revenue is approximated to be about $3,000. Working with these figures, Mr. Scholz is suggesting returning about $750.

Mr. Rosenthal suggested that the Board authorize a limited amount

between now and July 1977. Mr. Freedman would prefer that Mr. Scholz submit a budget to the Board first and the Board could take a vote by mail. After much discussion, it was MOVED by Mr. Freedman and SECONDED by Ms. Hopkins and

VOTED, That the Advertising Editor be immediately advanced $250.00 for advertising expenses, and that he be directed to submit a budget for the volume year to the ISAD Executive Secretary in order to have it distributed to the Board for approval by mail vote. The $250 advanced should be included in the overall advertising budget proposed.

The Editorial Board discussed the fact that ISAD does not have a publications committee. They suggest that the ISAD Board of Directors discuss the possibility that the Editorial Board act, at least initially, as a publications committee. After a year or so of operating in that capacity, the Board could decide whether or not two units were needed. Mr. Abbott saw no real problems in that idea as long as there was sufficient representation from the Audio Visual Section and the Video and Cable Communications Section. Ms. Brandt stated that she feels that there should be a publications committee at the division level and that it should consist of representatives of the sections. She suggested that if the division has a publication, that would be a concern of the publications committee at the division level. If the publication goes to a particular section, a committee would be needed at that section level. Ms. Brandt felt that the functions of the proposed publications committee would be to coordinate the publications that come from the division, to administer publications at the division level, and to coordinate publications at the section level.

Mr. Rosenthal asked whether there should be a unit to carry out the functions of publishing and, if so, should these functions be included in the *JOLA* Editorial Board's charge. After some discussion, Ms. Tighe proposed that the *JOLA* Editorial Board serve as a publications committee on an ad hoc basis through this year, paying careful attention to the concerns, questions, issues, and policies that this raises, and come back to the Board at the end of this year with recommendations on how they can be solved. If there are any problems identified or that the sections are unhappy with, the Board of Directors should be the arbiter.

At this point Ms. Martin interjected that there were problems in that *JOLA*, as a divisional journal, should represent the news and articles of the sections. In her opinion, *JOLA* has done this, as "Technical Communications" has been carrying AVS and VCCS coverage, which is not submitted, however, by the sections. She feels that there has been a lack of coordination. Mr. Freedman suggested that the two sections draft a proposed publication mechanism that they would be comfortable with; this proposal could be discussed by the Board and referred to the Bylaws and Organization Committee. Mr. Rosenthal extended that invitation to the Editorial Board also.

PROGRAM PLANNING COMMITTEE—Michael Malinconico. Mr.

Malinconico informed the Board that the committee intends to publish the proceedings of the 1975 institute, "Future of the Catalog." The proceedings have been through the first stage of editing and are now in the second stage of editing. He has no firm date for when they will be published. Mr. Rosenthal questioned whether or not the Board should consider in the future asking people other than the Program Planning Committee and those directly involved in planning institutes to edit proceedings. The Program Planning Committee felt that they could get the proceedings out sooner than ALA Publishing, due to the problems with the proceedings of the Las Vegas Institute. It was decided that if the editors of the proceedings needed help, they would send pages out to members of the ISAD Board for their assistance in editing.

Mr. Malinconico reported that Ms. Martin had contacted all of the speakers for the upcoming Networks institute in Chicago, and all have agreed to submit their papers to *JOLA* for publishing. Also Leslie Burke informed the Program Planning Committee of plans for a program on TV Reference at the Detroit Conference. They would like to ask RASD to co-sponsor the program. One reason for having a program on TV Reference is to see what kind of interest it solicits. If it does solicit enough interest, Ms. Burke would like to plan a two-day institute on the subject.

Additionally, Mr. Malinconico reported that the Audio Visual Section is planning a preconference prior to the Annual Conference in Detroit. The title is "Implications and Utilization of Newer Media Technology." Among the topics to be discussed at the preconference are technology (video and disc), building planning, sources of funding, copyright implications for media, and cataloging.

Two programs are scheduled at Annual Conference for VCCS, and the Program Planning Committee is only peripherally aware of one of them. Because of the apparent lack of communication the Board's general consensus is that a formal statement on how to plan a program should be written and made available to committee chairpersons.

The Program Planning Committee has recently finalized the plans for an institute on Automated Circulation Systems, to be held in Dallas, Texas, on October 21, 1977. The Library Administration Division Circulation Services Section has agreed to co-sponsor. The Board approved the committee's plans for the institute on Automated Circulation Systems. The committee would like not to charge a flat fee for exhibitors, but will ask them to pay out-of-pocket expenses. The committee had wished to be selective in choosing vendors who are established. Mr. Rosenthal felt that it would be safe to say that only vendors who have demonstrated their ability to apply automated circulation systems will be invited. After much discussion the Board decided that the Program Planning Committee should develop criteria for selection of vendors and have them stated in the written record.

The Board authorized the Program Planning Committee to proceed with

planning a preconference in 1978 in conjunction with the annual conference of the Association of Computing Machinery. The committee would prefer that ISAD assume any profits or losses and ask that Mr. Hammer negotiate with ACM regarding any payment they would need from us. According to Ms. Avram's contacts with ACM, they are in favor of setting up such a program.

Mr. Malinconico also informed the Board of plans for a preconference on the state of the art to be held prior to Annual Conference 1978. These plans will be formally submitted to the Board in June 1977. Because preconferences have been criticized in the past, Mr. Rosenthal questioned whether the preconference on the state of the art should be a program or a preconference. He felt that ISAD should have more programs which the members could attend free of charge rather than sponsor preconferences and institutes whereby members must bear a financial responsibility additional to their dues. Mr. Freedman responded by saying that the Program Planning Committee has not been deficient in planning programs in library automation for Annual Conference. It was his opinion that the programs held during Conference should be considered on their own merit and the institutes considered separately. He felt that ISAD could not sponsor a program with the same context and impact of an institute. Ms. Tighe commented that the preconference institutes could be viewed as a continuing education program which the format of the ALA program does not accommodate. Mr. Hammer commented that ISAD already gives their members the lowest fee, while non-members pay more. He also stated that there is nothing that the division is giving members that non-members cannot get. Ms. Martin suggested that the preconference institute is providing an educational service sufficiently extensive that it cannot be done without charge. A two-hour program where two speakers will speak for twenty minutes cannot be compared to a two-day program where 200–500 people are expected to attend. Mr. Rosenthal suggested that the Program Planning Committee continue with its planning for the preconference to be held prior to the 1978 Annual Conference.

On behalf of the Program Planning Committee, Mr. Malinconico requested that the Board recommend to ALA Headquarters that they establish a separate interest-bearing account for the income from ISAD's institutes. It was MOVED by S. Michael Malinconico, chairperson of the Program Planning Committee, and SECONDED and

VOTED, That the ISAD Board direct the ALA administration to explore procedures that accrue interest to ISAD on surplus funds earned from ISAD institutes preferably by establishing a separate account.

The Board discussed having a membership meeting at the Detroit Conference, June 1977. It was a general consensus of the Board that ISAD would have a membership meeting and social hour on Saturday, June 18, 1977, from 4:30 to 6:00 p.m. The Board directed Donald Hammer to insert

a letter informing the members of this business meeting in the brochure announcing the ISAD Bibliographic Networks Institute.

ALA PUBLISHING SERVICES—Don Stewart. Mr. Stewart reported to the Board regarding what the VCCS can and cannot do concerning payment of an editor for their proposed newsletter. The Executive Board requested the ALA Publishing Committee to re-examine and report to Council on Executive Board Policy #2153 at the 1977 Annual Conference with the understanding that interim action by the executive director may be required in the case of ISAD and *CableLibraries.* There is a policy on the books that states that an honorarium cannot be paid to a journal or newsletter editor. The Publishing Committee feels that it is time to re-examine that policy. Although the Executive Board is not ready to take action on that policy, they do not want to stand in the way of ISAD's arrangements. One of ISAD's options would be to pay a newsletter editor. This payment cannot be labeled an "honorarium." Mr. Stewart suggested it be called a "contractual arrangement for an interim period." The plan should be submitted to the office of the executive director and Mr. Stewart will then be delegated to work with ISAD/VCCS.

Mr. Rosenthal informed the Board that the attitude of ALA Publishing Services is to help meet the needs of the divisions and the units within the divisions, and the divisional emphasis on the element of speed in proceedings of institutes and conferences has been conveyed.

As far as royalties are concerned, there are no royalties being paid on the state of the art book, *Library Automation II,* that was published in 1975. Three thousand eight hundred copies were printed, and as of January 1, 1977, 1,916 copies have been sold.

The Board then completed unfinished business from the last meeting.

AACR SECOND EDITION DRAFT. It was MOVED by Ms. Avram and SECONDED by Mr. Freedman and

VOTED, That the ISAD reviewers of the AACR 2nd edition draft should examine the draft in regard to the following criteria which are inclusive, but not exclusive, of other criteria appropriate to ISAD's interests:

1. Is the new draft consistent with the function statement of the Joint Steering Committee?
2. Does the code satisfy the following ISAD concerns:
   a. Does it satisfactorily address national and international networking concerns?
   b. Does the code satisfactorily address non-book catalog control requirements?
   c. Does the code conflict with machine-readable cataloging activity?

Furthermore it is understood that the ISAD charge may exceed the scope

of the charge from RTSD regarding the review. The ISAD reviewers will fulfill the review requirements as defined by ISAD. The ISAD reviewers are encouraged to keep a record of their comments and forward them with any general recommendations to the ISAD President, at whose pleasure they are serving.

Mr. Hammer was directed to send a copy of the charge of the Joint Steering Committee along with a copy of this resolution to the four reviewers, to the ISAD representatives of MARBI, Judith Hopkins and Barbara Gates, and to the fifth reviewer to be appointed. He was also directed to send a copy of the resolution to John Byrum, Carol Kelm, and all thirteen division presidents.

The final draft supporting the VCCS effort to seek funding for a position within the ALA Washington Office which would monitor legislation activity was read by Ms. Tighe and discussed by the Board. It was MOVED by Ms. Brandt and SECONDED by Ms. Tighe and

VOTED, That the ISAD Board support the VCCS effort to seek funding for a position within the ALA Washington Office which would, on behalf of ALA, monitor and respond to regulatory and legislative activity in the area of video and cable communication. In addition, the Board instructs the sections and committees of the Division generally to monitor and respond to regulatory and legislative activity in their area of interest, and particularly, in relation to the proposed review of the Communication Act of 1934. Finally, that the Board itself assume the responsibility for informing the other ALA Division Boards of these actions.

BYLAWS AND ORGANIZATION COMMITTEE—Lois Kershner. The committee reported that they recommend the following name couplings for the division and the new section: division—Library and Information Technology Association/Division, section—Information Science and Automation Section; division—Library Technology Division/Association, section—Information Science and Automation Section. The committee preferred the first recommendation because it followed the wording of ALA goals. The majority of the Board agreed that they did not like the second recommendation. Ms. Kershner commented that if a question of a name is to be raised at a general membership meeting in the summer, the committee would recommend that a brief statement be made in *JOLA* to support any recommendation made by this Board. She also reported that a name change would necessitate a change in VCCS and AVS Bylaws Article III. The committee had considered the function statements of all the committees. In addition, the committee recommends that the divisional committees be Bylaws and Organization, Editorial Board, ISAD/LED Committee on Education for Information Science and Automation, Nominating Committee, and Program Planning Committee. Within the VCCS, the Publications Committee and Membership Committee are ad hoc at the present time. Mr.

Rosenthal thanked Ms. Kershner and the Bylaws and Organization Committee for fulfilling the charge of the last Board meeting. He felt that it would be unwise for the Board to take any action on the committee's recommendations at this Board meeting. Mr. Freedman concurred and also suggested that ISAD plan a third board meeting for Detroit, specifying one for action on the Bylaws and Organization Committee's recommendations. He also suggested that copies of the committee's report be sent to all Executive Committee members, the Board members, and all committee chairpersons, giving them a written deadline to send their comments to the executive secretary. All comments can then be distributed prior to the Detroit Conference; therefore the Board members can disseminate the documents before the next Board meeting.

Ms. Kershner was asked to add to the minutes a statement explaining the rationale of the Bylaws and Organization Committee to be published in *JOLA*. It was the general consensus of the Board that the membership vote on the division's new name at the membership meeting in Detroit. The Board stressed that the discussion be structured.

The Bylaws and Organization Committee was also charged to work on the development of a divisional manual. The committee recommended that the following items be included in a divisional manual:

1. Cover
2. Table of contents
3. Statement of responsibilities of chairpersons and officers of the division
4. Listing of deadline dates of the appropriate activities
5. Bylaws and/or any amendments to the bylaws
6. Membership of committees (roster) and function statements.

It was the general consensus of the Board that the function statement in the *ALA Handbook of Organization* and the function statement in the division Bylaws be exactly the same. Mr. Rosenthal directed the Bylaws and Organization Committee to review the function statement in the *Handbook of Organization* if they have not already done so.

EDITORIAL BOARD (continued). The journal is budgeted for ninety-six pages for an issue. If *JOLA* gets more advertising, then there will be fewer pages for editorial content. Mr. Freedman was concerned with the possibility that advertising would limit relevant information from being expressed. Mr. Rosenthal directed the editor of *JOLA* to report what has happened with advertising and the relative content of the journal at the Detroit Conference.

The Editorial Board felt that if the sections are going to have a newsletter, then "Technical Communications" should be removed from *JOLA* and have it as a newsletter of the sections. However, the reason it was incorporated into *JOLA* was economic. The Editorial Board also discussed candidates for editor for *JOLA*. Mr. Rosenthal asked the Board to talk with their colleagues and send suggestions to him for possible editor. In suggestions

of names, if it is known at the time whether the person would consider taking the job as editor, the Board members should notify Mr. Rosenthal.

SCHEDULING OF BOARD MEETINGS. Ms. Tighe was concerned that the Board meetings during Conference conflict with Council meetings. After Board discussion, the Board asked Mr. Hammer to find another slot for the Friday night, June 17, 1977, Board meeting and to try and avoid conflict with Council in the future.

VCCS—Kandy Brandt. VCCS sees their publishing needs as falling into three different categories: short news, single items, and research articles. VCCS feels a newsletter is needed to get short news out. The newsletter is needed to establish a communication link between regulatory response and users and practitioners on a daily basis. In addition, VCCS has the news of their section. VCCS has six committees that have projects under way where information needs to be delivered to the field for return input. VCCS is considering a monthly publication. Ms. Brandt explained that VCCS proposes to adopt *CableLibraries,* a publication now being published by Tepfer Publishers. They went into negotiations with the publisher and the editor. VCCS has arrived at the idea of paying an editor to work with them in publishing a newsletter. Ms. Brandt stated that the publication would be self-supporting, as it would be available through subscription. Mr. Rosenthal's concerns about VCCS's request were the precedent being set in paying an editor, with its implications regarding other publications in the division, and the relationship to the divisional journal and what the effects have. Ms. Brandt requested the endorsement of the Board in the merger of VCCS and *CableLibraries.* It was her understanding that the publication would be listed as a VCCS publication under ISAD. Mr. Freedman suggested that VCCS be permitted to proceed with all the reservations that have been expressed on an experimental basis not to exceed two years. Any time prior to the two years or at the culmination of the two years it may either become an on-going publication of VCCS or be incorporated as part of a divisional newsletter or other alternative as considered appropriate by the ISAD Board.

In regard to the subscription fee, Ms. Hopkins was concerned with the fact that members would be charged. Ms. Tighe commented that there is a need for a current, frequently published communication that deals with the needs of video and cable. Whether this should be done within ALA at all is questionable. Ms. Brandt responded by stating that VCCS has been criticized for using periodicals outside of the association to deliver news of their committees and it is also felt by VCCS that the newsletter would be a good membership tool. The proposed subscription fee is $10 for members and $20 for non-members. *CableLibraries* is now on a $15 subscription rate. Ms. Hopkins suggested that the subscription rate be free to members and $20 for non-members. If the VCCS members were to receive the publication free, ISAD would have to subsidize VCCS $1,500 for funding. Ms.

Brandt informed the Board that the urgency of this matter is that by Annual Conference, *CableLibraries* might fold and VCCS would not have a publication medium for rapid dissemination of news. Ms. Tighe suggested that ISAD think about a divisional newsletter on a timely basis, if there is no commercial vehicle. Mr. Hammer suggested that a newsletter come out as a quarterly publication at the times that *JOLA* is not distributed. After much discussion it was the general consensus of the Board that the Executive Committee of VCCS prepare a formal proposal with a supporting document showing a justification for the publication of the proposed VCCS newsletter. Mr. Freedman suggested that the Board authorize one newsletter from VCCS immediately that would have topical information. The Board gave its approval to VCCS's supplying information to *CableLibraries* until the matter is resolved. The relationship with VCCS paying their editor and *JOLA* not paying its editor will be discussed at the next Board meeting in Detroit.

BUDGET—Donald P. Hammer. The budget was discussed by the Board with questions as to why the division was paying for an ALA representative to ASIS, ANSI, etc. Mr. Hammer informed the Board that if ISAD did not appoint representatives to those organizations, Mr. Wedgeworth would. Mr. Freedman suggested that the sections assign representatives to these meetings and they go as ISAD representatives. He questioned whether the executive secretary should be the representative to these organizations.

The Board approved a third Board meeting established for the Detroit Conference to discuss the bylaws. The Board additionally asked Mr. Hammer to mail out the income figures, including income from institutes on a separate sheet, along with the budget for mail vote.

It was the general consensus of the Board that next Midwinter two hours be set aside for budgeting.

For informational purposes, Mr. Hammer informed the Board that there was a $1,500 balance from the sales of TV Kit and Video Guidelines. It was MOVED by Ms. Hopkins and SECONDED by Mr. Abbott and

VOTED, That the Board adjourn.

Technical Communications

Analysis of the Literature of Library Automation through Citations in the Annual Review of Information Science and Technology

For ten consecutive years, the *Annual Review of Information Science and Technology (ARIST)* has contained a chapter reviewing the library automation literature published in the previous year. Each chapter has been written by a different reviewer, often someone of considerable stature in the field.

It was hypothesized that a citation analysis of the ten volumes of *ARIST* published to date would reveal which periodicals have been of most importance to library automation over the past ten years.

Methodology

The reference lists from the ten *ARIST* chapters were examined, and references were tabulated. There was a total of 1,263 references, exactly 800 of them being to periodicals. There was therefore a mean of 126.3 citations per review, including a mean of 80 citations to periodicals. The actual number of citations per review ranged from 66 to 202, with the actual number of periodical citations varying from 31 to 129.

Findings

The 800 citations were found to refer to 122 separate periodicals (after allowance was made for title changes). Fifty-seven periodicals (47 percent) were cited only one time, which is to be expected in a Bradford-type distribution. Twenty periodicals (16 percent) were cited two times; 8 were cited three times; and 15 were cited from four to eight times each. The remaining periodicals, those cited more than eight times, are given in Table 1, in order by number of citations. It should be noted that the two most-cited periodicals, *Journal of Library Automation (JOLA)* and *Program,* were not published during the writing of the first three volumes of *ARIST*. What influence did they have on the distribution of the library automation literature? In particular, these

Table 1. The Twenty-two Most-Cited Periodicals in Chapters on Library Automation from the First Ten Volumes of ARIST

Rank	*Title*	*Citations,* ARIST *1–10*
1	*Journal of Library Automation*	114
2	*Program*	56
3	*Library Resources & Technical Services*	55
4	*Clinic on Library Applications of Data Processing*	41
5	*American Society for Information Science Proceedings*	40
6	*Colleges & Research Libraries*	34
7	*Special Libraries*	33
8	*American Society for Information Science Journal*	31
9	*Drexel Library Quarterly*	23
10	*Datamation*	22
10	*Library Journal*	22
12	*American Library Association Bulletin*	18
13	*Library Trends*	13
14	*Medical Library Association Bulletin*	12
14	*Wilson Library Bulletin*	12
16	*American Libraries*	10
16	*LARC Reports*	10
16	*UNESCO Bulletin for Libraries*	10
19	*Annual Review of Information Science and Technology*	9
19	*Australian Library Journal*	9
19	*Information Storage and Retrieval*	9
19	*Libri*	9

Table 2. Most-Cited Periodicals in ARIST *1–3, with Corresponding Occurrences from* ARIST *4–10*

Title	ARIST 1–3 Rank in 1–3	ARIST 1–3 Percent Occurrence	ARIST 1–3 Mean Citations per Volume	ARIST 4–10 Percent Occurrence	ARIST 4–10 Mean Citations per Volume
Library Resources & Technical Services	1	14.9%	5.7	5.5%	5.4
College & Research Libraries	2	14.0	5.3	2.6	2.6
Special Libraries	3	11.4	4.3	2.9	2.9
American Library Association Bulletin	3	11.4	4.3	0.7	0.7
Library Journal	5	6.1	2.3	2.2	2.1
Medical Library Association Bulletin	5	6.1	2.3	0.7	0.7
Wilson Library Bulletin	7	4.4	1.7	1.0	1.0
American Society for Information Science Proceedings	8	2.6	1.0	5.4	5.3
American Society for Information Science Journal	8	2.6	1.0	4.1	4.0
Libri	8	2.6	1.0	0.9	0.9
Library of Congress Information Bulletin	8	2.6	1.0	0.7	0.7

questions were asked:

- Which journals were most cited in *ARIST* volunes one through three (1–3) and which were most cited in *ARIST* volumes four through ten (4–10)?
- Which journals lost citations to *JOLA* and/or to *Program*?
- Were non-periodical publications affected?

The last question has a striking answer: for *ARIST* 1–3, 57 percent of all citations were to periodicals, while for the seven later volumes, fully 64.5 percent of the citations were to periodicals.

Most-cited journals from *ARIST* 1–3 as opposed to *ARIST* 4–10 are given in Table 2. As there were 114 periodical citations in 1–3 as against 686 in 4–10, results are not given in raw counts, but instead as percentages of the periodical citations in each group, and also as mean citations per volume.

Some interesting trends can be seen in Table 2. Owing to the small numbers of citations involved, however, the following interpretations cannot be considered definitive:

- *Library Resources & Technical Services* contained as much significant library automation literature before the advent of *JOLA* and *Program* as after; however, its proportional contribution to the literature has declined by almost two-thirds.
- Most other *library* periodicals lost substantial ground on a percentage basis, and also lost some ground on a citations-per-year basis.
- The two information science publications contributed more significantly to the literature in *ARIST* 4–10 than in *ARIST* 1–3, both in citations per year and on a percentage basis.

Examining only the volume immediately prior to *JOLA* and *Program* and the next succeeding volume (*ARIST* 3 and 4), we see in Table 3 some notable results which look very much like a direct loss of articles from some journals to others. Again, however, the small numbers involved make the tabulation suggestive only.

Discussion

As is typical of disciplines, subdisciplines, and application areas, over time the theorists, practitioners, editors, and publishers find each other, and reduce the scatter of papers in the field. Library au-

Table 3. Percentage of Citations of Selected Periodicals in ARIST *3 and 4*

Title	*Percentage of Periodical Citations in* ARIST *3*	*Percentage of Periodical Citations in* ARIST *4*
Journal of Library Automation	0.0%	18.8%
Program	0.0	17.7
Special Libraries	19.4	2.1
American Library Association Bulletin	19.4	1.0
College & Research Libraries	12.9	0.0

tomation is no exception.

In 1967, Markuson complained that most of the material on library automation was not in the open literature, and consisted of preprints, newsletters, and the like.

The following year, Griffin noted that "the literature of library automation is scattered," and mentioned *College & Research Libraries, Library Resources & Technical Services,* and *Special Libraries* as containing much of the notable material.

The authors of the 1969 through 1972 chapters in *ARIST* made no general evaluations of the literature, but in 1973 Simmons rated *JOLA* and the Illinois *Clinic* as being of prime importance.

In 1974, Bierman considered *JOLA* and *Program* as the leading sources of material. He rated *LARC Reports* as of lower quality than either. The *American Society for Information Science (ASIS) Journal,* the *Journal of Documentation,* "and publications of library associations occasionally contain significant articles on the subject." The *ASIS Proceedings* and the Illinois *Clinic* "contain a significant number of relevant articles."

In 1975, Alper considered *JOLA* to be "a key source." The *ASIS Journal* and the *Journal of Documentation* "also provided a significant volume of material," while *LARC Reports* "continues to be of lesser quality."

The major sources of library automation literature thus tend to be well known, but the extent of the influence of each periodical has not previously been quantified.

One flaw of subjective approaches can be seen in the praise given to the *Journal of Documentation* by Bierman, and especially by Alper. While this journal may well be of high quality, it is not a core journal in library automation according to the present analysis, having been cited in the library automation chapters of *ARIST* only six times in ten years, and only once in the latest four volumes.

Conclusions

Core lists of journals have historically been used for three purposes:

- to aid periodical selection by libraries;
- to guide information searchers to the richest probable sources of information in a field; and
- to help the scholar or professional determine the best place of publication for his manuscript.

The present analysis should be of help for all three purposes. The highest-ranking 8 periodicals, for instance, account for 50.5 percent of all references to periodicals in the library automation chapters of *ARIST* 1–10; the remaining 114 periodicals account for 49.5 percent.

This concentration is especially useful in that *ARIST* does not attempt to cover all relevant literature, but only the most significant. These eight periodicals therefore serve as a core collection for the use of libraries, information seekers, and authors.*—*T. D. C. Kuch, Division of Scientific Coordination, U.S. Consumer Product Safety Commission.*

* The complete tabulations of *ARIST* citations, and a more detailed version of this paper, are available on request from the author, 1700 Ivy Oak Square, Reston, VA 22090.

News and Announcements

University of Toronto Closes Public Card Catalog and Initiates COM Catalog

The University of Toronto Library (UTL) closed its public card catalogs as of June 30, 1976. Using the resources of University of Toronto Library Automation Systems (UTLAS), all cataloging from July 1 has appeared in COM fiche supplements which cumulate every four weeks. In addition, UTL has a retrospective file of nearly 1.2 million machine-readable records representing the bulk of the main library holdings, and these too have been produced in COM. Both the main file and the supplements have been duplicated extensively and catalogs are now located in many campus locations as well as on all floors of the library buildings. In addition to the fiche catalogs, the main file is also being produced in roll film to be used in motorized viewers (the ROM3). The reduction used in all cases has been 48×, with full blowback on the fiche viewer (SR-IV) and 39× magnification on the ROM3.

Another distinctive feature of the new catalog environment is the format now being used. The full form of the bibliographic record (called FBR), including collation, notes, and tracings, has been produced in selflist order. Separate author, title, and subject indexes to the FBR have been produced; these are brief index entries giving author, title, imprint date, and call number, plus location and copy information.

Filing has been changed to a strictly alphabetic, telephone book type of arrangement. Numerals file in ascending numeric value, and precede the alphabetic entries.

And lastly, at the time these files were being created, UTL was able to rid itself of its lingering reclassification problem. The "old" class catalog and the "new" (Library of Congress) class catalog have been merged into single alphabetic sequences in each of the three indexes.

Data on Capabilities of Nonprint Media Systems Sought by Project Mediabase

Project Mediabase—a joint effort of the National Commission on Libraries and Information Science (NCLIS) and the Association for Educational Communications and Technology (AECT)—is seeking information on the capabilities of existing nonprint media systems.

This information is being collected by questionnaire and will be compiled as an inventory to help guide the project team in developing functional specifications for the bibliographic control of nonprint media. The information inventory will be part of the project's final report.

George Abbott, project team member, indicated that, "It is important we receive input on all operational machine-readable data bases including bibliographic citations for nonprint materials." Any individual or organization that has such a system and has not received the Project Mediabase questionnaire is urged to request one from the AECT Project Mediabase Director, Howard B. Hitchens, AECT, 1126 16th St. NW, Washington, DC 20036, or from George L. Abbott, Project Mediabase, B101 Bird Library, Syracuse University, Syracuse, NY 13210.

The first phase of the NCLIS/AECT Project Mediabase is to develop goals, objectives, and functional specifications for the bibliographic control of nonprint media. The advisory panel to NCLIS for Project Mediabase brings together specialists from both private and public sectors. The development and writing of recommendations that emerge from the project are being done by a team headed by Jerry Brong (Washington State University). Other team members are George Abbott (Syracuse University), Jim Brown (ERIC/Information Resources), and Jenny Johnson (American Association of Medical Colleges).

Minicomputer Short Courses Offered at University of Pittsburgh

Two one-week short courses will be offered by the University of Pittsburgh Graduate School of Library and Information Sciences during the first two weeks in May. These courses are "Minicomputers in Libraries" and "Minicomputers in Library Networks." These courses are aimed at those who are considering or currently using minicomputers in library applications or in library networks. Each day combines classroom presentation with hands-on experience or local tours. The courses will be offered Monday through Friday, May 2 through May 13. Faculty will include Leon Montgomery, James Williams, and Frank Slater from the University of Pittsburgh, as well as Audrey Grosch from the University of Minnesota, Bill Mathews from NELINET, Jim Barrentine from OCLC, and Malcolm Lane from the University of West Virginia. The tuition fee for each course is $200. This does not include meals and lodging, which are available in University dorms or in nearby commercial facilities.

For complete details, please write MINICOURSES, INFORMATION SCIENCE, Room 720, LIS Building, University of Pittsburgh, Pittsburgh, PA 15260; (412) 624-5206.

Library Use of Microfilm Systems to Be Featured at National Micrographics Conference

The use of micrographics in public, private, and special libraries will be discussed at the National Micrographics Association's (NMA) Annual Conference and Exposition to be held in Dallas, May 17–20, 1977.

"Although librarians have used microfilm for back issues of publications for many years, there are many new micrographic technologies available today, such as computer output microfilm (COM)," said General Conference Chairman Warren A. Cole, Eastman Kodak Co. "We have, therefore, scheduled a special interest session on library applications for Tuesday, May 17, so that librarians can learn about new techniques, plus how to increase user acceptance of microforms."

Brett Butler of Butler Associates, Los Altos, California, will be the session moderator. He will head a panel of experts in library technology. The session will include case studies, problem solving, and questions from the audience.

Attendees will also be able to see examples of the new technology discussed in their special sessions. An exposition of hundreds of micrographic products and services, including readers, printers, computer output microfilm (COM) systems, microfiche, jackets, micropublishing services, and many other exhibits, will be open concurrently with the seminars on Tuesday, Wednesday, and Thursday.

The exhibits and the seminars will be at the Dallas Convention Center.

Besides Tuesday's special-interest seminars, the program will include general education sessions on Wednesday and Thursday. Topics such as the uses of color microfilm, selecting a reader, how to install a COM system, and training and certification for micrographic technicians will be discussed.

The exhibits and seminar sessions are open to NMA members and nonmembers alike. For further information and registration forms, contact John B. Bidwell, Conference Director, National Micrographics Association, 8728 Colesville Rd., Silver Spring, MD 20910; (301) 587-8444.

COM, Automated Printing Processes and Future Applications

"Microfilm-to-plate printing systems will grow dramatically with the increasing popularity of computer output microfilm," according to William S. Perkins, commercial development manager, Industrial Graphics Division, 3M Company, St. Paul, Minnesota.

Speaking at the recent Canadian Micrographics Association, Toronto, Canada, Perkins said that, "3M Company is aware of this trend and plans to maintain its leadership position in equipment and supply by addressing itself to the microfilm

as well as printing needs of the in-plant graphic business."

He quoted industry statistics that the microfilm market will double in sales from $1 billion in 1976 to $2 billion in 1980, with $4 billion forecast for 1985. "For 3M's Industrial Graphics Division, this relates to its new projection plate materials used with automated platemaking systems. Many products of our Microfilm Products and Photographic divisions will also have excellent growth potential, particularly through COM," he said.

Perkins cited the increased mailing costs (nearly double in two years) incurred by all industry, which continually is seeking ways to reduce bulk. One approach is to mail cartridge or reel microfilm or fiche in lieu of hard copy. "This may not be practical in many situations," Perkins said, "because of the continuing demand for hard copy. When this is the case, industry can increase efficiency by using offset plates to produce multiple copies directly from microfilm."

"The beauty of computers is that they can be utilized for composition formatting, storage capacity, fast retrieval, sorting and sequencing. New off-line publication systems further assist in updating and republication of data through the ability to generate not only characters, but also complex graphic forms. This advance combines both text and graphics on the same film and opens the door to direct imagery of offset plate materials," Perkins added.

One application he cited is the Vancouver, British Columbia, Telephone Company, which stores data for outside equipment purchases on a Perteo alphanumeric COM unit. To order an item, field personnel use numbers from a 580-page code book. One thousand distribution copies are required. (The code book is updated every three months in the COM unit.) 3M's four-mil negative projection plate is used in tandem with an Itek 11 x 17 camera, microfilm head, and 3M processor (identical to the 3M MR-412 Camera Plate System processor). The telephone company combines the advantages in composition and speed of the MTP system for direct imaging of projection plates from microfilm input. Plate volume is about 800 per month.

At Lockheed and Douglas Aircraft companies, illustrated parts catalogs are also created through imaging of plates directly from microfilm. Plate volume is high: well into five figures per month. Consumer rating sheets produced by A. C. Nielsen also use this system for fast turnaround and extremely high quality, Perkins said.

"Demand publishing is the over-riding description of these examples," he explained, "where machine-generated data is stored, selected, sorted, merged, edited in a computer and printed onto microfilm. The individual need for distribution then determines selection of duplication procedures based on cost, time and available equipment."

Perkins suggested that production printing from microfilm need not be confined to duplicator size out-plate or hard copy. Many businesses create engineering drawings which usually need duplication. In-plant printers are also seeking economies by imaging plates 2, 4, and 8 up by signature techniques to run on larger offset presses, he said.

3M Company offers an eight-mil large-format negative projection plate which is constructed of polyester in sizes up to forty-two-inch square, plus four-mil polyester-base negative projection plates in 400-foot rolls. For more information, contact Mr. Perkins at 3M Company, Building 235-1N, St. Paul, MN 55101, or call (612) 733-3643.

University of Toronto Announces the Availability of Machine-Readable Catalog Records (pre-1974)

The University of Toronto retrospective file of machine-readable records, in MARC format, is now available to other libraries who wish to use it as a short-cut to conversion of their own catalogs.

The records in machine form represent all the titles cataloged by the central library for the general collection, in all subjects, since the library was established in 1890. The conversion program began more than ten years ago; the record-content in the first work that was done (be-

ginning with Q in the Library of Congress classification) is less complete than in the bulk of the file, but neither part has ISBN or LC card numbers. Some 242,000 older records (up to 1959) are classified according to a local scheme, and the rest, about 863,000 titles added between 1959 and 1974, according to the Library of Congress scheme. The collection which they represent has been built to support teaching and research in faculties of arts and science, applied science and engineering, architecture, dentistry, forestry, management studies, medicine, music, nursing, physical and health education, pharmacy, social work, and a number of specialized centers and institutes. Publications in European and many Asian languages form a substantial part of the collection, particularly in the humanities. The machine records do not yet include rare books and special collections, maps, technical reports, or the holdings of other libraries on campus which do their own cataloging. In order to help with conversion of these other records, it is hoped that some of the costs of the conversion already done can be shared with libraries which can use the University of Toronto's computerized files to save time and money in their own conversion projects.

Now that the catalog of the whole circulating collection is in machine form, University of Toronto Library Automation Systems (UTLAS) is developing a circulation control system which will have, in its minicomputer, a compressed version of the catalog which can be searched online through public computer terminals. This use of compressed records by readers has been tested successfully, and the complete system is being designed as a package exportable to other libraries. It will represent another reason for many libraries to consider conversion of their existing card catalogs to machine form.

For libraries which wish to obtain machine-readable records from the retrospective file, the prices are: $1.25 per record for the first 50,000 records in one year for an individual library, and $1.50 per record for the first 50,000 records in one year for a group of libraries (e.g., province, region, or consortium); there is a 20 percent discount on records after the first 50,000 in one year.

Please note that these rates are for the records only. There are additional charges at standard UTLAS rates for computer processing and file building, now estimated at $0.30 to $0.60 per record, according to what a user may require, plus connect-time charges if on-line service is used.

Libraries interested in exploring possibilities should address their inquiries to Robert H. Blackburn, Chief Librarian. Inquiries for UTLAS services and costs may be addressed to Mr. Robin Braithwaite, UTLAS Assistant Director for Network Services, University of Toronto Library, Toronto, Ontario, Canada M5S 1A5.

Information Science Abstracts *Initiates Automated Production*

Automated production of current issues of *Information Science Abstracts* has been initiated under an agreement concluded recently with Chemical Abstracts Service, the publisher of *Chemical Abstracts*. The composition and index generation of *Information Science Abstracts* is now being performed at Chemical Abstracts Service in Columbus, Ohio, using automated techniques that generate a computer-searchable record in addition to photocomposed journal pages. This arrangement is regarded as a first step toward creation of a publicly accessible machine data base that will permit searching of *Information Science Abstracts* by computer.

Information Science Abstracts, a bimonthly journal, is an abstracting and indexing service in the field of information and library science. It is sponsored jointly by the American Society for Information Science, the Division of Chemical Information of the American Chemical Society, and the Special Libraries Association. It is published by the nonprofit corporation Documentation Abstracts, Inc., whose directors are nominated by the sponsoring societies. The journal is edited by Ben-Ami Lipetz of the Yale University Computer Science Department. The business office address is P.O. Box 8510, Philadelphia, PA 19101.

Composition of the first issues for 1976

was held up until July while the new arrangements were pending. The transition was an immediate success. All of the delayed issues are now in press, and no difficulties are anticipated for the future. Abstracts published in 1976 will total close to 4,500, a new record; and they will now be published two or three months faster than in the past.

Although a computer-searchable record is already being derived from the new composition process, it will not be available for general use for at least a year. Considerable developmental work is planned, to standardize the input format and the searchable features of the projected data base. Arrangements are also planned that will extend the computer-searchable data base back to 1966, the first year of publication of *Information Science Abstracts*. By the end of 1977, this would provide coverage of about 37,000 publications and would constitute the largest data base ever made available in the field of information and library science.

RTI Publishes New 1977 Catalog of Equipment and Supplies for Film Libraries/Media Centers

Research Technology Incorporated (RTI) has recently published a brand new 1977 catalog with 80 pages introducing more than 100 new AV items. The catalog includes RTI's complete line of film inspection/cleaning equipment, videotape conditioners, and storage systems, plus the supplies and accessories needed to stock a complete film library/media center.

RTI has recently expanded its line of 16mm film inspection/cleaning equipment to include models for 35mm and Super 8mm films. A low-priced line of portable cleaning units for filmstrips and 16mm, 35mm, and 8mm films has been introduced. The catalog also features an eight-page section of Lipsner-Smith ultrasonic cleaning and conditioning equipment and professional projectors.

A large collection of storage systems and supplies for videocassette tapes is included in the catalog. Film repair equipment, labeling machines, 16mm reels and cans, shipping cases, and media center furniture are also featured.

For a free copy, write to Research Technology Incorporated, P.O. Box 730, Skokie, IL 60076, or call toll-free (800) 323-7520; if line is busy, or if calling from Illinois, Alaska, or Hawaii, call (312) 677-3000 collect. Cable: RETEC. Telex: 28-9414.

OCLC Opens Western Service Center

The Ohio College Library Center (OCLC) has opened a Western Service Center in Claremont, California.

Because of the rapid increase in the number of participating libraries in the West, OCLC has decided to move many of its essential user services closer to these libraries. Training for libraries preparing to use the OCLC network system will now be less expensive and more convenient.

The Western Service Center will assist in designing unique profiles for card production, as well as deal with the day-to-day questions of participating libraries; train personnel in the use of new subsystems and advise users in the efficient utilization of current programs; and conduct workshops, seminars, and forums where participating libraries will be able to exchange information and learn from the nationwide experience of the network.

The Western Service Center is located at 9th and Dartmouth, Claremont, CA 91711; (714) 626-6305.

Telenet Publishes Directory of Computer-Based Services

Telenet Communications Corporation has published a forty-two-page directory of data banks, commercial service bureaus, and colleges and universities that provide dial-up access to their computer facilities over the nationwide Telenet network.

The directory is designed as a "yellow pages" for interactive computing and information retrieval services. More than forty organizations are cross-referenced by application specialities, programming languages, and data base offerings.

A researcher looking for a source of census data, for example, can use the data base section to locate a number of information retrieval services that maintain this information on-line. If a company controller wants to find out who offers interactive accounting packages, he can find this information in a special accounting applications listing.

All computer services connected to the Telenet network can be accessed by dialing a local telephone number in any of forty-seven cities in the United States, Canada, and Mexico. In-WATS lines are available for terminal users outside the local dialing area.

Single copies of the directory are available free of charge by writing: Manager of Marketing Services, Telenet Communications Corporation, 1050 17th St. NW, Washington, DC 20036.

Summary of the Program of the Canada Institute for Scientific and Technical Information (CISTI)

In 1974, the Canada Institute for Scientific and Technical Information of the National Research Council of Canada was inaugurated, bringing together under one organizational structure the two founding information dissemination services, namely the National Science Library and the Technical Information Service.

The institute continues to be a focal point of a developing Canadian network of scientific and technical information services which supports scientists, engineers, technologists, research workers, and small to medium-sized industry by giving ready access to scientific and technical publications in all forms, and by operating systems and services employing both conventional and computerized techniques.

The diversity of CISTI's program is best expressed by a brief overview of specific activities.

Technical Information Services (TIS)

Through a network of field offices, TIS provides Canadian secondary or processing industries with up-to-date technological information on the properties and processing of materials, the efficient operation of manufacturing facilities, new industrial developments, and the results of scientific research as applied to a client's requirements.

The Library

In addition to maintaining an outstanding collection of the world's published scientific and technical information literature, CISTI is the designer and operator of a variety of systems and services:

- Canadian Selective Dissemination of Information (CAN/SDI)—a national system for the selective and current dissemination of scientific and technical information based on fifteen machine-readable data bases serving 6,000 end-users in all provinces
- Canadian On-Line Enquiry (CAN/OLE)—a national system for the retrospective searching of large bibliographic reference files; fifty centers representing more than 200 terminal accounts are connected to the NRC computer in Ottawa via a dedicated eleven-city communications network
- Union List of Scientific Serials—a computerized national inventory of scientific and technical serials held in 250 Canadian libraries
- Unified Literature Search Service—literature searches and custom bibliographies prepared by CISTI's reference librarians utilizing conventional and computerized techniques
- Information Exchange Centre for Federally Supported University Research—a computerized inventory of university research projects funded by thirty-one federal granting agencies; the file now contains records of more than 40,000 research awards
- Health Sciences Resource Centre—services for Canada's health science community, including the Canadian distribution rights of Medline, Toxline, and Chemline retrieval services
- Interlibrary Loan and Photocopy Service—a major Canadian provider of loans and photocopies in the fields of science and technology to industry, universities, and government

In the operation of computerized ser-

vices such as CAN/SDI, CAN/OLE, and the Unified Literature Search Service, the INSPEC data base of the Institution of Electrical Engineers plays a significant role. The Canada Institute for Scientific and Technical Information is a subscriber to Section A: Physics Abstracts; Section B: Electrical and Electronics Abstracts; and Section C: Computer and Control Abstracts. Close to 900 end-users receive biweekly current-awareness information through the INSPEC-CAN/SDI program. Starting with April 1970, all INSPEC sections (800,000 references) are available on-line through CAN/OLE together with more than 2.5 million references from other major abstracting and indexing services. The INSPEC data base alone accounts for approximately 18,000 searches per year.

Broadly stated, it is the aim of the Canada Institute for Science and Technical Information to take whatever steps are necessary and possible to ensure that the right information is channeled to the right person at the right time.

Education and Telecommunications—Issues for 1977

The months ahead will see an unusually large number of communications policy decisions affecting educational interests, according to the Joint Council on Educational Telecommunications (JCET), a consortium of educational organizations which has served its members for more than twenty-five years as a mechanism for dealing with new communications technologies and emerging public communications policy.

At the Federal Communications Commission, Richard Wiley, present FCC chairman, is expected to leave when his term expires in June. In the meantime, the commission staff has prepared an elaborate and complex proposal regarding the Instructional Television Fixed Service (ITFS), a modest cost point-to-point TV service used by several major schools of engineering to offer graduate courses at off-campus locations and by medical schools as a link to teaching hospitals. The staff proposals are known to contain benefits which could substantially reduce the cost of ITFS operations, but may also look to taking from education some of the present ITFS channels and opening the band to the commercial Multipoint Distribution Service.

The National Aeronautics and Space Administration was removed from its long-established leadership role in communications satellite research and development by a 1971 administrative decision which terminated plans for a new series of experimental communications satellites beyond NASA's ATS-6 (used for health and education experiments in the Rockies, Appalachia, and Alaska, and for the SITE project in 5,000 villages in India) and the joint U.S.-Canadian Communications Technology Satellite (CTS). Now there is growing recognition within NASA, on the Hill, and among such independent observers as the National Academy of Engineering that that decision was premature. Pressure is growing to have NASA resume its developmental role in communications satellites with prime emphasis not upon the technological imperative of what the hardware can be made to do but upon developing technical solutions to the manifest problems of potential users, including those in health, education, and other public service areas.

The Public Service Satellite Consortium, a rapidly growing alliance of nonprofit institutions and organizations (the JCET is a founding member), foresees the possibility of being the recipient of a high-power satellite designed specifically for public service applications. Hughes Aircraft, which has built more commercial communications satellites than any other manufacturer, has filed a letter of intent with NASA, indicating interest in building such a satellite at its own expense if NASA will provide a free launch as a part of that agency's "pre-operational" space shuttle experiments scheduled for 1979. To help persuade NASA that a free launch is in order, Hughes promises to turn over the satellite for public service applications. Hughes' self-interest lies in its desire to showcase its newest advanced model, while NASA, on the other hand, is interested in demonstrating the utility and efficiency of its new space shuttle.

In the world arena, the International Telecommunications Union will hold a World Administrative Radio Conference in 1977 and another in 1979. WARC decisions have the force of treaties for the 140 member nations and the significance of WARC deliberations for educational interests in the U.S. is illustrated by the fact that without action taken at the 1971 WARC to allocate the 2.5 GHz band for satellites for education and community development (an action initiated by the JCET), past and future education experiments on ATS-6 would have been impossible. The 1977 WARC will deal with setting regulations for the emerging broadcasting satellite service. The 1979 plenary session will reexamine all current international regulations from telegraph and telephone to direct-to-home satellites and set communications regulations to the end of the century.

Public broadcasting has come a long way since the publication of the Carnegie Commission's *Public Television: A Program for Action,* and the growth of noncommercial broadcasting has exceeded the dreams of those who, with the National Association of State Universities and the Association of Land Grant Colleges, founded the JCET in 1950 to persuade the FCC to reserve channels for ETV. But there appears to be a growing desire to reexamine public broadcasting's strengths and weaknesses and where it may be headed. The Carnegie Corporation is open to discussion, and 1977 could well see the establishment of a second Carnegie Commission to apportion praise and blame and take a new fix on noncommercial broadcasting's lodestar.

The JCET serves its members as an "early warning line," keeping abreast of technological developments and policy implications. Regular and extraordinary meetings of the JCET Board provide a forum at which the educational community's interests can be discussed and defined. Before the Federal Communications Commission and in other national and international arenas, the JCET serves when directed by its board as spokesperson for the members' mutual concerns and helps to coordinate the efforts of member organizations in presenting education's case effectively.

To keep members informed, the JCET issues the biweekly *JCET Washington Wire,* a confidential memo to members only. In addition, a new version of the old *JCET Newsletter,* now named the *JCET Monitor,* is to appear each month. While seeking to be timely, the *Monitor* will stress longer articles which attempt not only to describe developments and events but to illuminate their implications for education and for policy formulation. Multiple copies of the *Monitor* will be sent to member organizations as part of the service provided for dues. Subscriptions are available to nonmember organizations and interested individuals at $45 per year.

In an article in *Communications News,* John Richardson, director of the Department of Commerce's Office of Telecommunications, depicted three possible communications futures: one shaped by technology, one by market forces, and one by public policy. In the months to come the opportunities to make conscious choices among those alternatives will likely be more numerous and more clear cut than at any time in the past four decades. Quite beyond its own parochial interests, the educational community has a responsibility to society to participate in the decisions which will be made.

For additional information about the JCET, contact Frank W. Norwood, Executive Director, Joint Council on Educational Telecommunications, Suite 413, 1126 Sixteenth St. NW, Washington, DC 20036; (202) 659-9740.

Library Audiovisual Software Storage Systems

Blackbourn, Inc., introduces a complete line of library AV software storage systems. The systems consist of containers for audio and video cassettes, filmstrips, films, and cartridges which can fit into any audiovisual lending department.

The container albums are compact and dust-proof and are easy to handle and check out. They allow storage of AV materials on shelves like books. The al-

bums also provide a safeguard against theft. Containers are available with options such as label holders, silk screening, pockets, hot stamping, and padded covers. Contact Blackbourn, Inc., 1821 University Ave., St. Paul, MN 55104 or call (612) 646-2781. Free brochure available.

New Kodak Computer Output Microfilmer

A new computer output microfilmer providing users with a high production capacity and extra flexibility to handle a great variety of microimage requirements was announced by Eastman Kodak Company. The new Kodak KOM-85 microfilmer is designed for high- and medium-volume users requiring fast turnaround. The KOM-85 microfilmer is the third COM unit introduced by Kodak since 1967. It retains the reliable, field-proven hardware and software of the earlier models and incorporates new capabilities and design improvements.

Like its predecessors, the Kodak KOM-85 microfilmer is capable of producing microfilm at transfer rates up to 120,000 characters per second. It provides a variety of reduction ratios and formats on 16mm and 35mm roll film, as well as microfiche in widths of 82.5mm and 105mm. Data can be produced on microfilm with or without preprinted forms.

A new, expanded-page format capability has been added as an option, allowing the microfilmer to create computer pages that are wider and deeper than the standard 132 characters per line and sixty-four lines per page. This option permits filming of pages containing up to 172 characters per line and up to eighty-eight lines per page. It thus accommodates all existing computer-page formats.

Easier film handling in the new microfilmer is a major operator convenience and a means of increasing overall production, since less time is required to change film. Film cassettes can hold up to 1,000 feet per load, permitting longer runs between changes.

Independent adjustments for character height and width permit operator control of the size and aspect ratio of all characters being displayed and filmed. This allows more accurate character registration, better differentiation, and flexibility to meet the requirements of page expansion, reduction ratio, film, and processing mode.

Easier retrieval of information on microfiche has been made possible by a new flexible column indexing capability, in addition to automatic extraction of fiche titles and indexes. Since a single four-by-six-inch microfiche may contain more than 200 pages of data, the ability to place an index above or below each column of pages helps users to locate desired data more quickly and easily.

Also new on the Kodak KOM-85 microfilmer is the ability to create high-contrast fiche titles and eyeball characters. This is achieved by a special dense character that does not require overprinting.

Automatic retrieval of data on roll film is facilitated with this microfilmer by an option that permits special key descriptor document coding for use on the new Kodak Oracle retrieval terminal. This new terminal locates any desired image on a roll of microfilm in seconds. Conventional image-control and odometer retrieval coding are included in the standard package.

An expanded character capacity in the new microfilmer allows users to install up to 121 characters. This makes it possible to use optional lowercase letters, special symbols, foreign-language characters, etc.

Users who have extra mainframe time and memory available for COM formatting may write their own applications programs or employ resident Kodak Info-Link software, a comprehensive utility package that handles all aspects of COM formatting. Such users can employ the low-cost Kodak magnetic tape unit, a read-only device that accepts 9-track, 1600 bpi tapes, or they may select from other commercially available magnetic tape units.

Users who wish to avoid special mainframe software for COM may use the Hewlett-Packard Magnetic Tape Reformatting System (MTRS). The MTRS is a complete front-end system for off-line reformatting of print-image tapes, designed specifically for Kodak KOM equipment by Hewlett-Packard and made available through Kodak. It affords great

flexibility since it can translate input from virtually any computer system.

A universal tape drive, a minicomputer with 32K memory, and an intelligent terminal with two read/write cartridge drives and a CRT display make up the MTRS. The tape drive accepts 7- and 9-track computer tapes, 200 to 1600 bpi, NRZI and PE inputs. Use of an optional second tape drive increases production by allowing a new job to start while the previous tape rewinds.

The MTRS simplifies operation and improves throughput by permitting automatic program loading, integrated job set-up, and interactive control. Conversion and reformatting software supplied by Kodak is stored on a minicartridge in the terminal, allowing the minicomputer instant access to programs, routines, and job parameters.

The operator simply mounts a job tape from the computer system on the MTRS tape drive, sets a switch for the appropriate tape format, and types the job name on the terminal keyboard. The tape data are converted, formatted, and given to the KOM-85 microfilmer, which then records them on film at throughput rates up to 300 pages per minute.

Further information is available from Dept. 6032, Business Systems Markets Division, Eastman Kodak Company, 343 State St., Rochester, NY 14650.

Book Reviews

Elements of Information Resources Policy: Library and Other Information Services, by Anthony G. Oettinger. Rev. ed. Report to the National Commission on Libraries and Information Science. Cambridge, Mass.: Harvard Univ. Pr., 1975. 217p. OEC-0-74-9075.

This volume is a remarkably valuable "white paper." To the reader who does not carefully absorb the title, it is an initial disappointment, because it makes virtually no recommendations about national information resource policies. The key word in the title, though, is *Elements.* The report, prepared as one of a series of background papers for the National Commission on Libraries and Information Science, does an extremely valuable job of concisely laying out the elements which are affecting the development of national information policy, with which NCLIS is presently grappling.

The organization of the report takes some adjustment of expectations, as well. The report, as identified in the table of contents, comprises only the first 17 pages of the document; the appendix, notes, and bibliography fill out the remaining 204 pages of the volume. The report is really little more than an abstract, but the abstract is extended enough to provide some citable (if not fully documented) overall findings, e.g., *"Functional accounting is a rarity . . . there are only minimal data on the costs of various services . . ."* (p.14).

The compilation of the seventy-seven tables and figures is perhaps the most immediately valuable portion of the book, and after the initial reading the user will probably find the list of tables the most effective index to the topics covered (no topical index is provided). While the authors emphasize that "All data used were already on hand somewhere or readily derived; making fresh measurements or surveys was beyond the scope of our work," they have nonetheless managed to select and combine most illustrative comparative data. An example is a single table comparing the historical trend in the size of payrolls as a percent of operating expenditures for the Postal Service, public schools, public libraries, Bell Telephone, and General Motors!

The presentation of the various elements with interests in the operation of information services is (despite the lack of specific recommendations) highlighted by analytic observations, and not a little detached irony—concluding a discussion on interlibrary loan, "It is therefore unlikely that the general public is aware of its legal right" (to request interlibrary loan).

Some data seem to be already dated, and the breadth of the survey has resulted in some inaccuracies in detail. In the section on library networks, for instance, the June 1974 figure of 900,000 OCLC records is coupled with a somewhat older estimate of 200 terminals in place; both have changed considerably. And, the statement that "At first, the MARC project addressed itself to new books only. Since 1970, project RECON was begun," leaves the inaccurate impression that LC is still actively converting retrospective records.

But the perspective of the impartial observer makes up for such minor points. Again from the library networks section, ". . . the development of these organizations has brought to the fore a set of cost accounting issues which have rarely surfaced and perhaps not even been recognized in the traditional library world. . . . The whole gamut of problems of accounting for shared resources . . . surface in full glory" (p.115).

In summary, for those engaged in library R&D, this book is the desk-top quick reference. Its uneven literary and aesthetic style only testifies to the limited support and interest which has been given

to the political policy elements of information systems in the past. While the data in the volume are incomplete, they are drawn from the best we have. One hopes the authors will continue investigation of these policy issues in more depth.

Brett Butler
R&D Associates
Stanford, California

Serials Automation in the United States; A Bibliographic History, by Gary M. Pitkin. Metuchen, N.J.: Scarecrow, 1976. 157p. $6.00. ISBN: 0-8108-0955-9. LC: 76-18116.

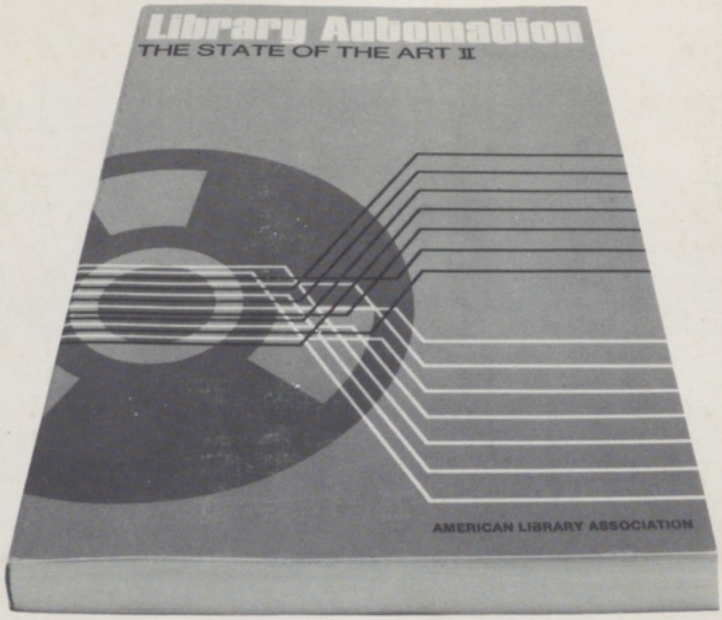
The publisher's blurb says it all: "This book provides access, in one place, to all information published on the automation of serials control functions in the United States and cited in *Library Literature.* Articles on union lists and other cooperative projects such as the Ohio College Library Center or the National Serials Data Program are excluded."

The author has searched *Library Literature* from 1949 to 1974, and has chronologically presented each appropriate citation with a detailed annotation, some of which are extremely lengthy. One gets an accurate feeling for the tone and level of specificity of the article itself from the author's annotations, which rely heavily on quotations from the source material.

The volume ends with an author index and an index by serials control function which shows the type of library and the name of the institution. The latter index may well be the most valuable part of the book.

This reviewer's reactions to this volume seem to vacillate from high praise to severe criticism. How very useful it is to have such a compendium of serials information; one hopes fervently that Mr. Pitkin's thorough search of *Library Literature* will serve to relieve all others of the necessity of having to do the same. But why was only the one index consulted? What of the articles cited in other indexes? The valuable reports from other countries, especially Canada and England? What of the useful items available from ERIC? How can one possibly justify omitting any mention of CONSER, NSDP, MARC for serials, ISDS, ISBD(S), and ISSNs? One fears that this book may, by its sins of omission, convince someone somewhere that serials automation can be undertaken in the late 1970s without having to pay attention to these myriad international developments, and to that extent this volume must be considered valuable but dangerously inadequate.

Peter Simmons
School of Librarianship
University of British Columbia



Library Automation

THE STATE OF THE ART II

Susan K. Martin and Brett Butler, editors

These proceedings of the preconference institute, held at Las Vegas, Nevada, in June of 1973, review and evaluate the advances in library automation since the earlier institute in 1967. Unlike the proceedings of the first meeting, they focus on operating systems and operational technology. Leaders in the field present papers reviewing changes in the past five years, a hardware review, four applications reviews (public services, cataloging, acquisitions, and "innovative" applications), a statement of personnel needs, and a forecast for the future. Discussion periods are included in the text and are a valuable supplement to the prepared talks. The volume also includes an extensive bibliography compiled by Martha W. West.

200 pages Paper LC 75-20168 ISBN 0-8389-3152-9 (1975) $7.50