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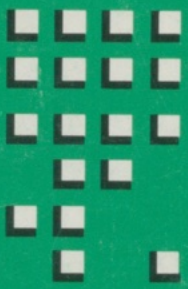

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State of the Art

In this special issue of *JOLA*, we are pleased to present a collection of papers from LITA Library Automation: State of the Art III, held in Chicago on June 22–23, 1978, as a preconference to the ALA Annual Meeting.

In her excellent paper, which opens this issue of the *Journal*, Henriette Avram offers a comprehensive appraisal of present networking activities at the national level. My own paper points to the convergence and confluence of electronic technologies ready to be orchestrated into new information services. Fay Blake then warns of recent tax reduction initiatives as an obvious cause for alarm.

Eleanor Montague strikes at perhaps the most challenging aspect of our present state of affairs—learning to manage automation efforts effectively. Carl Spaulding reminds us of the many opportunities to integrate micrographic techniques into system designs. And finally, Allen Kent makes some predictions concerning the new patterns for resource sharing that will soon be evident.

Also in this issue, we are very pleased to present a new bibliography on library automation. This outstanding compilation by Martha West, Alice Quiros, and George Glushenok is a vital contribution to the field, and we are all indebted to them for their diligent work.

In assessing the state of the art, it seems to me that some broad trends are starting to appear. We are just now beginning the third decade of serious library automation efforts in this country. In the first decade of that effort, the phrase "library automation" was nearly a contradiction in terms. There was an evident clash and confrontation between the traditional humanistic value system of the library community and the apparently dehumanizing, impersonal, mechanistic set of values held by the practitioners of technology. This situation was further complicated by an abundance of highly promoted projects, promising incredible results, but which ended as impractical experiments.

During the second decade of library automation, however, it became clear that, while technology was not in itself more humanistic, at least there were some economic benefits to be derived. In the library's fight for survival, cost-efficiencies and improved techniques could only help. So the second decade was a period of adjustment, compromise, and tolerance: an uneasy peace was struck between the librarians and the technologists.

Now, I think, with the third decade of library automation, we are beginning at last to see something we had all wished for from the start: a fundamental partnership and accommodation of technology to some of the basic humanistic values cherished by the library community. Succinctly embodied in the present state of the art is the promise of a humanistic technology for information access and sharing built on the concept of person-to-person communication of ideas. It remains for us to insist that this promise is fulfilled. WILLIAM D. MATHEWS

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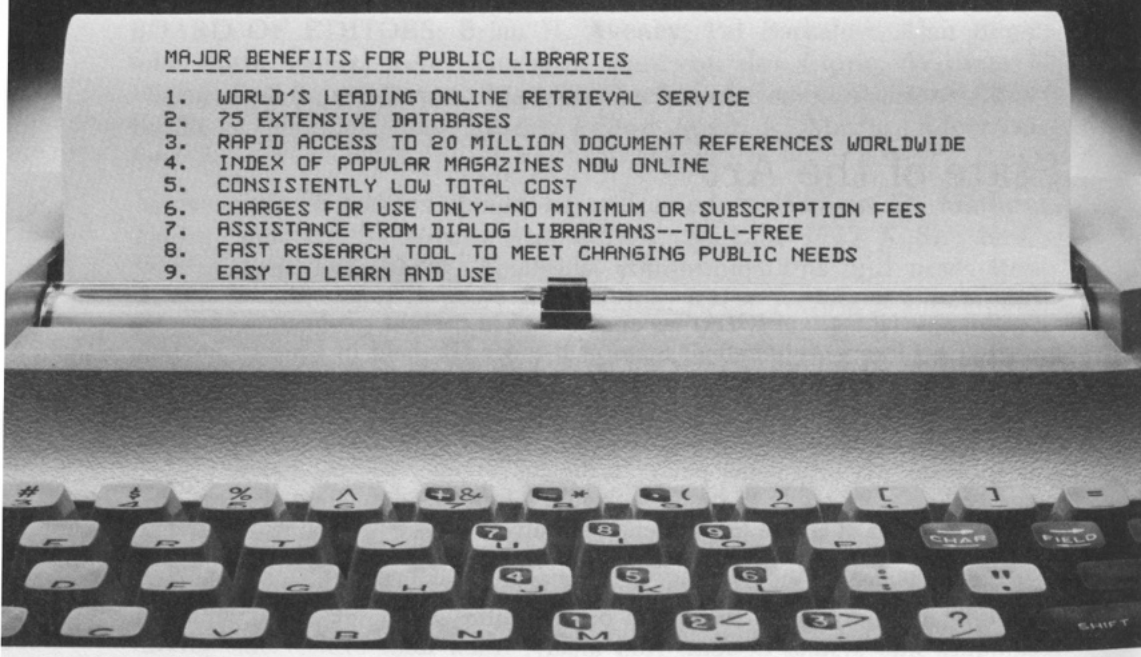

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Toward a Nationwide Library Network

Henriette D. AVRAM: Network Development Office, Library of Congress, Washington, D.C.

Present national and international library networking activities are reviewed both in terms of the status quo in 1978 and, in the case of the United States, the efforts underway toward implementing a more coordinated and comprehensive system than presently available. Included is a discussion of the Network Advisory Committee, the Network Technical Architecture Group, the Network Advisory Committee's governance subcommittee, the Library of Congress' data base configuration project, and network funding.

INTRODUCTION

When invited to contribute to this conference, it was natural to review the proceedings of the State of the Art I—1967 and the State of the Art II—1973 institutes. State of the Art I really represented a landmark in the history of library automation since it was the first conference on the topic and it was the first meeting of the newly formed Information Science and Automation Division of the American Library Association.

The year 1967 was an exciting time for libraries. Joseph Becker, in giving the keynote address, predicted, "I firmly believe that the future of library automation is inextricably tied to the computer and to new communications developments . . . ,"[1] and "Once bibliographic data are available in machine-readable form, the next step is to communicate and display these data rapidly in a form suitable for use at the local library level. This is the responsibility of the communications network."[2] And I, in a presentation on the MARC Pilot Project and the implications of the future operational MARC system, stated, "MARC has forced primitive resolutions of these human and logistic problems resulting in an unplanned bonus, the outline of a network."[3]

By 1973 significant progress had been made. Many production systems were in operation and the Ohio College Library Center (OCLC) was already a success.

What about the last five years—what has transpired between State of the Art II and State of the Art III? Certainly the state of the nation's economy has been felt by all of us. As a result, the requirement for resource sharing in its broadest sense, that is, the sharing of bibliographic, computer, and people resources, and of the materials themselves, has been accelerated. In the past five years we have seen fewer stand-alone automation projects. Available monies

have been principally expended to develop systems capable of serving many organizations. Networking, always an "in" word, has become a household term. However, the various automated bibliographic services we developed were all different. How would we ever bring these disparate pieces together into a cohesive whole for the sharing of resources? It was in response to this question and the question as to the role of the Library of Congress (LC) in the evolving network that the Librarian of Congress created the Network Development Office (NDO) in 1976 and I am here with you in a new role.

I shall describe what is happening as I know it or, in some cases, as I see it. I shall review progress as well as problems. In my crystal ball, I see, in the not-too-distant future, a computerized bibliographic system which will provide a coherent, fully connected facility for a two-way flow of services between any two participants in the network. Participating nodes will include for-profit organizations, not-for-profit organizations, intra- and interstate networks, etc. LC will be a node in this network, both distributing bibliographic services to and receiving bibliographic services from the other nodes. In addition, individual organizations will be assigned the task of creating and converting catalog records for materials in a given language and/or about a particular subject. These cataloging centers will require direct on-line access to standard national bibliographic and authority files in order to provide a national record, in accordance with accepted cataloging and format standards, without duplication of effort.

We are attempting to build a bibliographic system which will allow the sharing of bibliographic resources, resulting in significant cost savings in individual libraries. Additionally, and this is the principal benefit, such a system will make available the information resources of this country to the users of libraries, and in the end that is what it is all about.

Where are we toward this end? To build a nationwide network is to assemble organizations and individuals into a mutually beneficial relationship while maintaining a high degree of autonomy for those organizations and individuals—which is a very large order. This process will take place over many years, with many activities proceeding in parallel. It is not simple to categorize or assign names to these many activities, which, unfortunately, do not fit into nice, neat little black-and-white boxes. Individuals involved with complex systems work in that wonderful gray world where ideas can be proven to be neither right nor wrong until tried, and then there is high praise for success and high price for failure. There is no well-defined map to follow that will guarantee arrival at the destination, but one thing is for sure—we are on our way.

REVIEW OF THE STATUS QUO

In order to predict where we are going we should first take a brief look at where we are now. Several different types of networks or network-related organizations have come into being. These are principally of two types: (1) organizations coming to be known as bibliographic utilities, which have large on-line bibliographic files primarily, but not exclusively, used for technical processing purposes; and (2) organizations coming to be known as service centers, which contract for services from one or more of the bibliographic utilities and commercial organizations and may perform certain local services. There are other organizations which do not quite fit into either of these types, such as the National Library of Medicine, the National Agricultural Library, System De-

velopment Corporation, Lockheed, and New York Times, which up to now have concentrated on the reference function.

Bibliographic Utilities

There are three bibliographic utilities which are presently providing products and services to libraries and other information agencies—namely, OCLC, Inc., BALLOTS, and Washington Library Network (WLN).

All of these bibliographic utilities provide certain common services. All permit the sharing of catalog data through the input of new records and the adoption or modification of existing records. Catalog cards are provided if desired. All have certain capabilities for searching.

During the last year, OCLC has undergone a major change in its governance structure, reflecting its nationwide scope and providing for increased participation in OCLC governance by regional networks and institutional members. The composition of the Board of Trustees has been expanded and a Users Council has been created. OCLC currently reports approximately 1,500 member libraries, extending over almost all areas of the contiguous U.S. While its shared cataloging system provides an individual institution's catalog records in card and/or magnetic tape form, those records do not exist as a collection in the on-line data base and are not therefore available on-line. This is significant for those organizations desiring to maintain their catalogs in machine-readable form in the network computer rather than on a local machine. An interlibrary loan service is soon to become operational, as is an acquisition system. Currently operational for a limited number of participants is a serials check-in system. A significant tool provided by OCLC is the union catalog of OCLC participants. Although discussions are underway concerning an authority system, there is no such system at the present time. There is no subject searching capability.

BALLOTS, having recently been selected as the processing facility for the Research Libraries Group (RLG), may be destined to become a major research library system in the future. BALLOTS has also recently undergone a major organizational change. It is now set up as an independent entity reporting to the president of Stanford University through the Office of the Provost. BALLOTS presently has approximately 150 member organizations. From a networking point of view, one of its principal deficiencies has been the necessity for maintaining separate records for the same bibliographic item for each member organization. Not only is this costly in terms of storage, but it precludes union catalog capability. Nevertheless, the capability to maintain an institution's catalog on-line in the network computer does exist, and the redundancy mentioned above is being corrected. The searching system is powerful and includes subject access. BALLOTS plans also to include implementation of a multiphase authority control system. Major efforts have been directed toward modifying a system built for the Stanford University Libraries to a system to satisfy network requirements. Its acquisitions and in-process systems are available only to Stanford libraries.

During the past year the WLN blossomed out, expanding its services to participants from out of state for the first time, implementing a new computer configuration which dramatically reduced response time and increased system stability, and joining its sister utilities in demonstrating at conferences and thus becoming better known nationally. In July 1977, WLN became a legal entity in

the state of Washington as opposed to being a project of the state library. The Washington State Library Commission is responsible for the network, which is administered by the state librarian in his capacity as executive officer. A Network Executive Council, elected by the WLN Representative Assembly, made up of representatives of all types of members and all categories of membership, develops policy recommendations to be presented to the commission through the state librarian and considers substantive issues such as procedures, protocols, cooperative programs, and services, based on advice given to it by subcommittees assigned different areas of responsibility. The WLN system is the first to implement an authority control component. The quadraplanar data structure, based on the University of Chicago design, provides authority control for more than one set of authorities—for example, institutions using LC subject headings and institutions using Medical Subject Headings (MESH) subject headings—but, at the same time, uses a single basic descriptive record, thus minimizing redundancy in data storage. Institutions' records are maintained in the on-line system and there is a union catalog facility. A unique feature of WLN is the production of COM catalogs in a register/index format. An acquisition system has been put into limited production and a circulation system is planned which will operate in a decentralized mode, but with the circulation information accessible through the on-line system. Searching by subject is available.

A possible new entrant into the field of bibliographic utilities is the University of Chicago, which up to now has served only the University of Chicago libraries. It is currently working with a group of libraries in the Midwest Library Network (MIDLNET) on the details of a technical development plan for the use of the Chicago technical processing system by initially about eight libraries. The Chicago system is a complete technical processing system encompassing selection, ordering, acquisitions, cataloging, locations, and holdings. It is intended that all capabilities would be extended to participating institutions. Authority records are linked to the bibliographic records and are accessible on-line, although references have not yet been added to the authority records. The Chicago-designed quadraplanar system will be implemented in the course of expanding the system to a network. Network participants will be able to access their own records and other participants' data as desired as a single master record with participant variations and location/holdings data appended.

Service Centers

Service centers, in addition to contracting for commercial (or other) reference services, may perform other activities, which may include the maintenance of union lists, interlibrary loan, etc. There appears to be a trend toward the development of service center minicomputer systems to serve as message concentrators between member organizations and the bibliographic utilities and also to perform local functions.

The service centers have grown in number over the past few years. Although the scope of their membership differs, some being interstate, some intrastate, and at least one, namely the Federal Library Information Network (FEDLINK), defined by type of library, all share common problems and many have joined together in the Council for Computerized Library Networks (CCLN). Service centers have created the need for a new type of position, that of network executive director.

Library of Congress

LC continues in its role as a national service by making available its cataloging and authority data through the MARC Distribution Service. Its current machine-readable cataloging output is approximately 200,000 records a year. The distribution of name authority records data began in May 1978 with approximately 35,000 headings converted from April 1977 to April 1978. The distribution of subject authority data, which has been temporarily suspended due to procedural problems, will be resumed at a later date. The announced on-line distribution service has been indefinitely postponed awaiting congressional resolution. However, LC continues to expand its internal capabilities. MARC serials as well as books are available on-line, and searching capability has been expanded to include access by keyword.

TOWARD IMPLEMENTATION

Network Advisory Committee

The remainder of this presentation addresses those aspects of building a network that are in a transition period, i.e., the activity is underway—implementation is yet to come.

Shortly after the Librarian of Congress created NDO, the Deputy Librarian called a meeting of senior representatives of many of the network-related organizations to explore the possibilities of increased cooperation and coordination in networking activities. These individuals are policy-level people in their own organizations and consequently bring this level of expertise to nationwide planning. This first meeting led to several more, and the group, known as the Network Advisory Group, was reconstituted and formally established as the LC Network Advisory Committee (NAC) in 1977. For the remainder of this presentation, regardless of the period of time under discussion, all reference will be to the committee. When NAC was established, LC invited organizations and associations to participate through the representation of qualified individuals rather than inviting individuals regardless of affiliation. Thus, a very broad segment of the library community has representation in the proceedings. Organizations such as the Association of American Publishers (AAP), the National Federation of Abstracting and Indexing Services (NFAIS), Chief Officers of State Library Agencies (COSLA), the Information Industry Association (IIA), etc., were invited as observers in order to guarantee from the onset that as many information agencies as possible would be knowledgeable of NAC and related activities.

NAC is responsible for the preliminary edition of the paper *Toward a National Library and Information Service Network: The Library Bibliographic Component*.[4] This paper, although more limited in scope, was based on and in accord with the National Commission on Libraries and Information Science (NCLIS) program document which calls for tying together all information agencies into a full-service network to deliver services and materials to the citizens of this country. Recognizing the futility of attempting definition of the entire information network because of its complexity, NAC isolated the library bibliographic component as that component of the network which would demonstrate the viability of networking in the shortest time frame by providing for the sharing of bibliographic resources.

What is the library bibliographic component? This has not been a simple concept to define. The definition given in the glossary prepared by contractual support to NDO is "that portion of the national library network encompassing its bibliographic service system and segments of its communication system, and exclusive of the resource library system."[5]

The NAC paper has been widely distributed for comments and suggestions for revisions and additions prior to the publication of the final text. The paper does not constitute a master national plan but specifies some significant first steps, thus serving as a working paper for the NAC, NDO, and other network-related organizations.

Like many good committees, NAC has groped for its purpose. It is an advisory committee to LC and, as such, its respective members are not accountable to any single governing authority. Without such accountability, it sometimes becomes difficult to determine its credentials and its relationship to many other ongoing activities. Nevertheless, in spite of this conundrum, NAC members voted that they felt it was worthwhile to keep the committee in being and that a recently appointed Steering Committee, whose charge is to frame the issues and set the agenda for NAC meetings, also continue in its role.

NAC is considered the parent committee of the Subcommittee on Governance and the Network Technical Architecture Group (NTAG), and approves or disapproves recommendations from those committees. NDO, acting as an interim network coordinating agency as recommended in the NAC paper, serves as a secretariat to NAC and, in addition, reports to NAC on progress made on projects under its direction. NDO considers its role as one of coordination and cooperation with network-related agencies and therefore its activities are complementary to NAC and NTAG efforts.

Governance

Of the many requirements for a national library and information service network, none is as sensitive as that of governance.

Governance consists of structure and personnel at the highest level of an organization for the purpose of controlling policy, directing management, and maintaining productive relationships with the organization's constituencies.

Who those constituencies are depends on the nature of the organization. The traditional governance structure of an industrial corporation is a board of directors elected by the stockholders, with the chief officer of the corporation responsible to the board. In the 1930s the boards of directors for industrial corporations were mostly made up of individuals with financial skills. However, in the late 1970s there is a growing tendency to have representation by those most affected, e.g., consumers of the services or products, or employees of the company. Following this trend for a library network, the governance structure will also include representation of those most affected, e.g., libraries.

The legal and governance structure of the capping agency for the full-service network will require legislation, and the responsibility for working toward this falls to NCLIS. Nevertheless, in order to operate the library bibliographic component and its communications network, we must eventually determine the governance structure of that component of the information network. Accordingly, NAC set up a Subcommittee on Governance with the charge that a work statement be written that will eventually become a request for proposal calling

for a study to recommend a legal and governance structure. Citing from the subcommittee's fourth revision of the draft work statement, the request for proposal "seeks further details regarding the organization which might be responsible for the development and operation of a comprehensive electronic communication system which interconnects bibliographic services throughout the country."[6] The subcommittee has met several times beginning in 1977 and still has not arrived at agreement on the wording of the work statement. Nevertheless, the fourth revision, with a dissenting opinion appended, was submitted to NAC in June 1978 and also submitted to CCLN, which had earlier asked that it be given the draft work statement for review and comment at the same time as NAC.

It can be expected that the costs and benefits of resource sharing, the role of technology, and the problems of funding and governance—all network-related issues—will also be discussed in whole or in part at the White House Conference on Libraries and Information Science and at the state conferences that precede it. The purpose of the conference process is to assess the present status of library and information services, set goals for their improvement, and determine the means for reaching those goals. Networking, particularly the NCLIS concept of a "full-service network," cannot help but be a common theme and basic component of the state and national conferences. Since one of the tangible products being sought from the White House conference—particularly by Congress—is direction for needed legislation (or legislative amendment), it would seem to behoove all of us, as members of the networking community, to begin to work now on the outlines of such legislative initiatives.

What changes are needed in state legislation to implement full-service networks at the state level and to commit funds to cooperative, interstate endeavors? What modifications or new legislation are needed to facilitate national development? The White House conference offers an opportunity to examine these questions, make our case to the general public—to whom, after all, that conference is geared—and attempt to gain their support for implementation of the necessary legislation. It is an opportunity to communicate with the grass roots, to make our case through a new channel, and I urge you all to take full advantage of the opportunity.

Other Organizations

The NAC document principally recommends specific tasks for a network coordinating agency and operational units of LC. However, one section of the document was reserved for specifying "Tasks for Other Network Organizations" and includes an introductory statement: "There are numerous tasks to be undertaken by the networking community to supply undergirding detail to this preliminary network blueprint . . . ."[7] CCLN was the first to form a subcommittee to prepare a statement. Following CCLN's lead, AAP, NFAIS, and COSLA have also presented papers to NAC, and others are in preparation by IIA, the Association of Research Libraries, and the Medical Library Association.

A recommendation was made by AAP that AAP, NFAIS, IIA, and the Magazine Publishers Association work toward the coordination of all private-sector responses. Consequently, LC and NCLIS will meet with these organizations to work toward that end. All papers will be published in the final text of the NAC document.

There has already been some concrete evidence of positive action from this activity. The CCLN paper advocated a direct flow of federal funds for state, intrastate, and interstate network support. COSLA, in its position paper, recommended funneling of all federal funds through state library agencies. The conflicting papers could both have been published in the final NAC document, but would have resulted in a report of confusing advocacies. Consequently, representatives of CCLN and COSLA have met to discuss the issues and rewrite their respective papers in light of these discussions. The resulting statements will probably have some sensitive areas to be negotiated as developments occur, but the major conflicts appear to have been resolved.

Benefits from this activity will result from joining together organizations that exist to provide different categories of information services to users. Their relationships should be complementary and each segment of the network that is developed must be consistent with the development of all others.

Network Technical Architecture Group

NTAG has met frequently since its establishment by NAC in 1977. The members of NTAG are principally individuals on the technical staffs of the major on-line library systems and knowledgeable in computer systems, telecommunications, and data base design. The charge given to NTAG by NAC was to design and implement the technical network configuration or architecture.

This effort was divided into two phases. The first phase was an expansion of the present RLG/LC project to other institutions. For those of you not familiar with the RLG/LC project, communication links were established between the computer at the New York Public Library (NYPL), presently the host computer for the RLG, and the LC computer. Staffs of member libraries, at the present time Columbia University Library being the principal user, search the RLG data base residing in the NYPL computer, and if the desired record is not found, the query is transmitted to the LC computer, invoking LC software. If the record is found at LC, it is transmitted from the LC computer to the NYPL computer for further processing. A proposal to expand the RLG/LC project, not yet funded, was written jointly by five of the organizations represented by NTAG members. The purpose of the first phase of the project is (1) to expand the RLG/LC capability to a broader geographic base and thus more effectively test the tradeoffs between the cost of storing the entire MARC file in each system versus having these records available on demand from LC; (2) to test the utility of making the location of library materials available to regional networks through access to the LC Register of Additional Locations; (3) to test the concept of cataloging centers by providing on-line access to the LC files whereby LC headings could be referenced by the institution creating the cataloging records; and (4) to implement in a short time a quasi–resource-sharing system while the longer-term system with bidirectional capability is being developed.

The second phase of the project is the development of the bidirectional capability, where each automated bibliographic service would be linked to each other as well as to LC. What is envisioned is a network principally made up of two parts. The automated bibliographic services that would form one part are the hosts on the network and can be considered message processing systems. Hosts could provide similar or different services and/or products. They would

be autonomous, as they are today—but their services would be expanded by the ability to share data between themselves for whatever purpose. The requirement for adding to or modifying the present systems would be limited to those modules, hardware and/or software, that permit them to "join" the network. The second part of the network would be the message delivery system—responsible for the transmission of messages between the hosts connected to the network. The message processing system then is the user interface—the system that responds to the user's needs for services. The message delivery system is transparent to the user, responding only to the demands placed upon it by the hosts.

An important aspect for the communication of information over the network is the use of protocols which provide the facility for a message from one host computer to be received and understood at another host computer. Data communication protocols have been developed by international standards bodies, but application protocols are required, embedded in lower-level communications protocols, to carry on meaningful data exchange. A task force jointly sponsored by NCLIS and the National Bureau of Standards (hereafter referred to as the NCLIS/NBS task force) has recently completed documentation of a proposed application-level protocol for a nationwide bibliographic system.[8] This has been a major accomplishment toward network development and represents, to the best of my knowledge, the first application-level protocol ever developed by a community of users, removing a major roadblock toward building the network. The NCLIS/NBS task force recommended that a pilot project be developed to test the protocol in a "live" situation. The development of a plan to implement such a pilot project has been funded by LC using contractual support under the technical direction of NTAG. The contractor's report will recommend the types of institutions which should participate and the degree of involvement which will be required by them to meaningfully implement and test the protocol. The NTAG bidirectional message delivery system will incorporate this applications protocol.

NTAG's efforts in recent months have been on the definition and documentation of the general requirements for the message delivery system. This completed document was submitted to NAC and approved at its meeting on May 18–19, 1978.[9] This document will be made available to the community through the LC Cataloging Distribution Service.

The recommendation made by NTAG to NAC was that an "independent contractor with demonstrated expertise in the area of telecommunications networking be engaged to undertake the preparation of detailed requirements for the message delivery system."[10] NTAG is now involved in the preparation of the request for proposal for the detailed requirements. Prior to being submitted for bids, the request for proposal will be submitted to a funding agency. If funds are forthcoming, NTAG will act as technical monitor for the performance of the contract.

During the course of its deliberations, NTAG recognized the problem of the lack of standardization in the types of queries and responses in present systems. How, for example, will a query for an author/title search input to OCLC according to their prescribed procedures be routed on to BALLOTS if OCLC does not respond with the requested record? The BALLOTS system cannot manipulate a search key of this type. A study was commissioned by NTAG,

funded by the Committee for the Coordination of National Bibliographic Control, to develop a method of notation expressing the queries of several of the systems for comparison purposes as a first attempt toward evaluation of approaches to the problem.

Because technical projects cannot be undertaken in a vacuum and require coordination with other, nontechnical activities, NTAG is currently investigating the interrelationships of active and anticipated projects and defining what requirements the technical projects place on the other activities.

Bibliographic Aspects of Building a National Data Base

Compared with a decade ago, the number of available machine-readable records has increased manyfold. There is a growing acceptance of the MARC format as exemplified by the input specifications of such organization as OCLC, BALLOTS, WLN, the University of Chicago, and others. It is becoming increasingly evident that no one organization, including LC, can meet the cataloging requirements for the nation, and consequently, we are turning our sights toward cooperative cataloging and conversion. However, this does not mean that we yet understand how to build a consistent nationwide data base.

There are at present two projects in progress aimed toward this end. Under contract to LC, Helen Schmierer of the University of Chicago is preparing a set of "bibliographic conventions," that is, a data preparation manual, based on the LC *Data Preparation Manual: MARC Verifiers*,[11] for the creation of bibliographic records independent of any particular institution's automated system. The conventions are based on the full MARC format and on the use of *AACR 2* for current cataloging. The Association of Research Libraries (ARL) Task Force on Bibliographic Control* and relevant agencies of the American Library Association will be invited to review the results of this work. This means that, regardless of where the data are input, the records created should be consistent as to the data elements and content designation provided, and the cataloging rules followed. This would be a major step forward toward the building of a shareable nationwide file.

The second project underway at LC is concerned with the design of a national data base configuration including an authority control system. The complexity of the design of systems where the inter- and intrarelationships of bibliographic, authority, and location files are expanded to include the requirements for multicollections has been recognized for some time. Likewise, the importance of a facility to provide for a consistent data base built by records input from many sources, in an on-line and off-line mode, is also recognized.

We are witnessing systems that have incorporated in the design adherence to standards for single and multicollections through the use of an authority control system, namely the University of Chicago, WLN, and NYPL. However, to date little has been accomplished in investigating how best to expand these design concepts for the requirements of a national system.

*The ARL Task Force on Bibliographic Control identifies areas of concern to ARL relating to bibliographical control, and develops and recommends to the board appropriate positions, policies, and actions for the association. In fulfilling this responsibility the task force develops liaison with other groups whose deliberations influence developments in national bibliographic control.

The LC work currently underway is the result of an investigative study performed by Edwin Buchinski, National Library of Canada, under the administrative and technical direction of NDO and funded by NCLIS. A small evaluation team composed of representatives from organizations outside of LC as well as from LC's Processing Services guided the effort. The result of the study was the identification of nineteen tasks, which became the basis of a request for funds by NDO. The actual performance of the tasks is now considered the second phase of the project and has been partially funded by NCLIS.

The tasks defined include those providing essential background and data and those concerned with possible data base configurations, access to files, and other design elements. Since organizations look to LC as a node in the library network, especially in the area of authority control, the tasks include the LC file requirements and the relationship between these files and those of the network. The tasks, when completed, will be used as input for detailed design.

Required background tasks will be performed using the NCLIS funds while additional monies are sought.

Tasks underway at the present time are:

1. Analysis of the various cataloging rules and subject headings systems followed by the nation's libraries.
2. Analysis of the reference tools used and required for determining authority relationships.
3. A statistical analysis of the entire LC/MARC file to determine the characteristics of personal names and the growth rate of the authority file in comparison with the bibliographic file.
4. Determination of how series authorities should be handled.
5. Which of the options included in *AACR 2* are to be used by LC.

LC's Processing Services and Automated Systems Office will cooperate with NDO in the performance of this work. Edwin Buchinski will be one of the investigators and several of the tasks will be performed by contractual support. A Bibliographic Advisory Committee has been formed, with Joseph H. Howard of LC serving as chairperson. The committee will provide guidance on bibliographic-related tasks. The ARL Task Force on Bibliographic Control and NTAG have been invited to have representatives on this committee to guarantee the coordination of efforts. Additionally, all work will be coordinated with NTAG from the onset.

International

Since the data base will include materials published in other countries, international activities also have an impact on our system, and two of the current activities are considered worth reporting here.

At their meeting in Oslo, Norway, in 1975, the Directors of National Libraries determined that the international exchange of bibliographic data was of growing significance to national bibliographic agencies and directed that a meeting be called to consider international MARC network developments. This meeting took place in Paris in October 1975 and the conferees decided that certain studies should be performed to accelerate planning and development. A Steering Committee was established to monitor the conduct of the studies, resulting in a final report which contained a series of recommendations.

The Steering Committee identified four of the recommendations from the

report which it considered should receive the highest priority for further study. These recommendations dealt with (1) copyright in relation to the international exchange of data, (2) the variety of subject heading systems and languages, (3) a minimum set of indexes to be included in all MARC data bases, and (4) international authority control.

The Directors of National Libraries decided that the first study to be conducted should address the problems of copyright, since MARC records prepared by national agencies are becoming increasingly available through the international MARC system. The national agencies are planning and, in several instances, have concluded bilateral arrangements with each other to cover the conditions of supply and use of records, and there is no general agreement on how to deal with international copyright laws in this exchange environment. What is needed is a general set of rules or guidelines which would provide an overall framework for an international agreement covering the supply and utilization of MARC records. Joseph A. Rosenthal, associate university librarian, University of California at Berkeley, accepted the responsibility for this study.

In the interim, the sections on Cataloguing and Mechanization of the International Federation of Library Associations and Institutions have established liaison with each other to work on the fourth recommendation, international authority control. A small working group will be formed to determine specifications for further work.

Network Funding

The formation of NAC, the publication of its planning document, and the many other activities of NDO in concert with other organizations created the environment for Lawrence G. Livingston, Council on Library Resources (CLR), assisted by NDO, to prepare an initial proposal for funding the implementation of the library bibliographic component of the national library and information service network. This proposal was the basis for early discussions with several funding agencies. With the untimely death of Livingston and the retirement of Dr. Fred C. Cole, president of CLR, Warren J. Haas, his successor, has augmented the initial proposal and carried forward the effort to seek funds to develop what he called a "comprehensive computerized bibliographic system for libraries." The plan is based on the cooperative efforts and the involvement of many organizations.

The activities included in the request for funding were formulated during discussions with many individuals concerned with networking and library automation. Among these activities are (1) the specification and design to build a comprehensive computerized bibliographic data base to include bibliographic, authority, and location records; (2) the design and implementation of a data communication message delivery system to provide the bidirectional linking of automated bibliographic services; (3) expansion of the present capacity of LC; (4) continuance of the various network committees; and (5) a study to recommend a governance structure. Special attention is being given to the management of the development effort. It is anticipated that initial responsibility will be vested in a management committee involving LC, NCLIS, and CLR, with CLR assuming administrative obligations. Several advisory teams would be established to assure effective review of fundamental objectives, operating policies, and technical questions.

SUMMARY

Any discussion of the bibliographic, technical, and governance aspects of a nationwide library network generates a parallel discussion of the economic viability of the system. An economically viable system is one which is capable of sustaining and improving itself. How much will it cost to develop the library network, and once developed, how much will it cost to maintain and operate? It is too early to be precise about costs of development because at this time our knowledge of the parameters for design and the resources required is still limited. However, advancing technology is reducing the per-unit cost of information sharing and making it increasingly feasible to consider a nationwide network. An example of this is the recently established Satellite Business Systems. Some smaller users will now be able to afford the capabilities provided by satellites because new methods of using this technology have lowered the cost per record (the unit in this case) to make this possible.

Although the costs of development may be partially supported through granting agencies, there is little doubt that organizations participating in the network will also bear some developmental costs. The final system, however, must be maintained and operated by the monies it charges the users of the system. This implies a system that will provide innovative services and products while lowering the per-unit cost of doing so.

As we advance in design, it will be possible to get a firmer grasp on costs. For example, it should not be too long before the organizations planning to enter the network via the message delivery system could estimate the hardware and/or software costs to their organizations for participation. Likewise, as we establish bibliographic conventions based on standard formats and cataloging codes and practices, libraries should be able to determine with a fair degree of confidence the cost to create and convert cataloging data according to these bibliographic conventions. Users of bibliographic utilities should by now have determined the cost benefits of shared bibliographic data.

I feel quite sanguine that the groundwork has now been laid for a nationwide library bibliographic network. We must continue the coordination of technical and bibliographic developments so as to avoid an irreversible trek to chaos. It is encouraging to note that funding proposals have gone forth to continue to work toward the development of a comprehensive computerized nationwide data base and that this component is viewed as an integral part of the total national program for library and information services envisioned by NCLIS. What is essential is the good will, support, and commitment of organizations within the various segments of the community to build a system permitting a redeployment of effort and new patterns of sharing information.

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Advances in Electronic Technologies

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Relevant advances in electronic technologies are explored. Microprocessors have revolutionized information processing techniques. New storage devices are now extending the flexibility of data files. New digital transmission capabilities will soon have a dramatic impact on telecommunications. These several technologies are converging to open new opportunities for library and information service applications.

INTRODUCTION

This paper provides a brief overview of advances in electronic technologies during the past five years. In fact, there have been entirely too many notable developments to cover them here in a comprehensive way. Rather than simply enumerate the many developments, this paper instead attempts to point out major trends and tendencies, and interprets the impact of those recent developments which are of particular consequence for the library community.

In speaking of electronic technologies, let me make it clear at the outset that my interpretation of what constitutes electronics is likely to be somewhat broader than the usual interpretation placed on that term. I will, of course, mention electronic hardware. But I will also touch on an aspect of the legal and regulatory environment, which is so pertinent right now and which will determine to a large extent precisely how we can use electronic inventions in our society. And in my concluding remarks, I will make some brief observations about management and organizational issues that seem at this juncture to be especially critical to the process of effectively introducing electronics into the library atmosphere.

To begin with electronic hardware, we will consider three broad areas:

1. *Processing*—or logical manipulation and handling of information.
2. *Storage*—new techniques and devices for recording information.
3. *Transmission*—advances in our ability to transport information from one place to another, chiefly by telecommunications.

INFORMATION PROCESSING TECHNOLOGY

In the area of information processing hardware, the single most important trend to note is the onslaught of the microprocessor. In the past five years a

tide of microprocessors of every description has engulfed us. This tide has carried with it a multitude of applications. These ubiquitous devices have for some time been the brains behind hand-held electronic calculators; they are now beginning to appear in the automobile in ignition systems and carburetors and in the household in electric ranges and microwave ovens, washing machines, telephones, televisions, and hi-fi equipment. Manufacturing processes in the petroleum industry, chemicals, pharmaceuticals, plastic production, and metal fabrication are all coming under control of microprocessors. And in every area of digital information processing, especially in telecommunications and peripheral devices, inroads have been made. Bar code readers in libraries and supermarkets alike use microprocessors.

At the National Computer Conference this past summer there was a contest to see who could build a mouse, roughly to scale, with enough completely self-contained intelligence to find its way through a maze. The conference was held near Disneyland. The mouse was built around a microprocessor. The winning entry was somewhat taller than your average gray mouse, but was still able to navigate through the narrow corridors of the maze, deduce which paths it had already taken, and find its way out. Probably next year it will be down to scale.

The microprocessor is a culmination of a seemingly endless series of elegant design innovations in solid-state physics. Densities of well over two hundred logic gates per square millimeter of silicon chip surface area are now common. We still don't know how many angels can dance on the head of a pin, but if we ask the same question about electronic components, the answer is undoubtedly several hundred. The cost/performance ratio of microprocessors has improved by a factor of ten in the last five years. A device weighing only a fraction of an ounce can functionally replace what used to occupy an entire room full of electronics a decade ago, at 1 percent of the cost.

The microprocessor uses very little energy and has few of the environmental requirements of older machinery. Air conditioning, for example, might not be necessary for a general-purpose computer using microprocessor technology. The practical consequence of this is that it is now possible to bring the computer to the problem instead of bringing the problem to the computer.

To translate the advent of microprocessors into tangible consequences for library automation, I would like to mention four specific trends in information processing design.

- *Specialized High-Performance Auxiliary Processors.* "Bit-slicing" microprocessor architectures are being used to add specialized functions to general-purpose computers. Currently, most of these functions are of the vector processing or number crunching variety—taking large matrices, for example, and carrying out operations in parallel on entire arrays. While the relevance of this may not be immediately apparent, I believe it is only a matter of a year or two before similar processors are employed for text handling operations rather than exclusively for number crunching. Sorting operations come readily to mind as an area where parallel processing could be used to great advantage in an auxiliary processor to an otherwise general-purpose machine. Sorting, of course, takes up a lot of processor time for traditional business applications as well as in library automation.
- *Processor Mimics and Look-Alikes.* Some years ago, IBM was under siege

from independent manufactures of plug compatible memories and peripherals. Now there is a frontal attack on IBM mainframes themselves, from Amdahl, Itel, Two-Pi Systems, and, most recently, National Semiconductor. National Semiconductor, in effect, is implementing a functional equivalent of the 370 processor on its own microcomputer chip. The chip is then incorporated into a large minicomputer (or small maxicomputer) to form a system which outperforms and undersells parts of the IBM 370 family. This blurring of distinctions between micros, minis, midis, and maxis is itself worthy of brief note. The fact that micros are being used as the processors in minicomputers which mimic maxis makes it ever harder to use any of those terms intelligently.

In practical terms, the ability to mimic processors fairly easily also means that even if a family of computers is discontinued—the Xerox Sigma family used by the Ohio College Library Center (OCLC) comes readily to mind—a processor that mimics the discontinued line can be manufactured at much lower costs than the software could be rewritten. To be sure, this will be a mixed blessing. Hardware elegance will be used to compensate for software inadequacies. We may well enter the twenty-first century with some of the software design mistakes of the 1970s hanging around to haunt us. On the other hand, the software and operating system discontinuities that were so difficult to cope with in the shift from second- to third-generation hardware would be unthinkable now. So perhaps it is just as well that ways have been found to introduce radically new hardware without rocking the boat.

• *Multiple-Processor Systems.* With the advent of relatively inexpensive processors has come a tendency to construct system configurations with redundant processors to achieve objectives of reliable, continuous operation. The Tandem machine at OCLC is a case in point. Detecting failure in one of its processors, this system can automatically replace the failed part with a backup processor. In general, it is now a commonplace occurrence that what seems at first glance to be a single processor system will, on closer inspection, turn out to be several closely coupled processors with distributed responsibilities and a network of data sharing arrangements within a single system.

• *The Personal Computer Phenomenon.* A booming market in affordable home computers is now very much in evidence. Home computer systems now cost about as much as home high-fidelity systems—not dirt cheap but not outrageous either, roughly from $300 to $3,000. This phenomenon has some interesting characteristics. It has its well-spring in the ready availability of microprocessors. But literally hundreds of small entrepreneurs, using cottage industry methods, are producing hardware, software, and peripherals for personal computers. By pulling together a market from a very diverse set of interest groups—hobbyists, engineers, educators, students, scientists—reliable and inexpensive devices are being supplied to all. This has reversed a previous pattern in which innovations for the scientific and technical community were reworked and became fallout for later application by the commercial sector. Now there is a boom in construction of scientific and medical instruments built from this new strata of affordable components. Naturally, this is of some importance for library automation. Reliable, affordable, library-oriented systems can be assembled from home computer components at a fraction of the hardware cost of a comparable system using traditional commercially available parts.

But the home computer phenomenon probably has an even greater sig-

nificance for libraries if we recognize it as the first step toward personal information systems. Many people have speculated, accurately I think, that home entertainment centers and personal computers will be important targets for specialized information services. Libraries will have to determine what piece of this pie will be theirs.

In fact, the innovations that gave rise to the microprocessor are still continuing. Theoretical limitations have not yet been reached. There are, however, a few ominous signs. The cost of testing microprocessors, after fabrication, is becoming a larger and larger part of manufacturing costs. The extraordinary complexity of these circuits, combined with the subtlety of their failure modes, presents new challenges to reliability. This situation has also had some effect on servicing and maintenance. Where once microprocessors were looked on with great favor as a means of increasing reliability through reduction in component count and overall complexity, it now appears that some reasonable balance may be reached short of putting everything on a single chip. A recent article by a hardware manufacturer ponders this very question while exploring the consequences of very large scale integration techniques. The article considers the possibilities of having more computerized intelligence on a single chip than anyone can figure out what to do with. Being a hardware manufacturer, of course, the author finds a way out of the dilemma.

The real lesson, it seems to me, for those of use nurturing our paranoia, is that we must be ever so much more careful the next time someone hands us a martini. Not only to determine that the toothpick isn't an antenna, but to make sure that the pimento isn't an operating system.

INFORMATION STORAGE TECHNOLOGY

Now I would like to mention some advances in devices for digital information storage. For many of us oldtimers who still refer to a computer's primary storage as "core," it is time to update our vocabulary. Most of the primary storage in computers is now supplied by semiconductor circuits and has been subject to roughly the same factor-of-ten improvements in cost performance over the past five years. There have been notable developments in memory technology affecting three areas of the performance spectrum: the high-speed end, the midrange, and the low-speed bulk memory systems. For the first time ever there now exists essentially a continuum of devices across the entire cost-performance spectrum.

- *The High-Speed, High-Performance End.* On this end, it is now fairly common that even a small computer system might have a cache memory, a small associative memory retaining the most recently referenced information in a readily available place. In some cases the cache memory might be only the tip of the iceberg, or more precisely, the top of a hierarchy of memories having a wide variety of characteristics, with data being shuffled from one part of the memory to another to achieve some optimum in performance. Memory management, dynamic memory allocation, and virtual memory schemes, once found only on large computer systems, are now appearing on computers costing less than $100,000. Another tendency is to incorporate operating systems and compilers into read-only memories within the computer. While this trend toward off-the-shelf machines which understand higher-level languages is laudable for the

most part, it makes the process of equipment purchase more complex and blurs traditional distinctions between hardware, firmware, and software.

- *The Midrange.* Here, the development of charge-coupled devices and bubble memories has filled a gap which previously existed in the continuum of memory devices. These devices are faster than mechanical devices such as fixed-head magnetic disks, and slower than other semiconductor memories. Cost per bit also places them between these two types of memory. These devices work like gigantic shift registers, propagating electrical charges or magnetic domains in a circulating pattern in which bits can be accessed and rewritten once per cycle of the memory train. They have an advantage over magnetic disks in that no mechanical parts are involved, yet they can be used to store a significant amount of information and can be treated like a structured file system if so desired.
- *The Low-Performance End.* On this end, there has been continued improvement in recording densities of magnetic media. Floppy disks and microfloppies provide a convenient way to ship data through the mails, just in case the mails still work. More exciting, I think, is the prospect of using videodisks for digital storage. The videodisk was developed for the consumer market as a medium for recording television broadcasts.

The powerful effect of consumer electronics is an interesting story in itself. Consumers are beginning to take their leisure time very seriously, and a few brief items will indicate the magnitude of the market for home entertainment equipment. (1) Home videotape units are selling at nearly double the pace of last year. (2) Home video game sales are projected to reach nearly $.5 billion a year in 1980. This would represent about a twenty-five-fold increase in five years. Lest the importance of that $.5 billion figure escape you, that means that in 1980 the American people will be spending more for video game hardware than the total acquisitions budget of all libraries of all types in the U.S. during that same year. (3) A chain of franchise stores for the total home video environment now exists. Included in the offerings are tape machines, videodisks, video games, and video projectors for the total video experience. Also included are pinball and popcorn machines, microwave ovens for your TV food, and a new line of furniture specially designed for watching projection TV. Enough, one might hope, to drive sensible people off to their libraries for escape.

Used in a digital mode, a single video disk can store the entire Library of Congress MARC file on one surface. Since it was designed as a mass-production medium, copies can be made from a master for pennies—fifty-five pennies to be exact. Even adding the cost of producing the master and shipping the copy, this means that copies of a fairly large bibliographic data base could probably be made available for under $10 apiece. Readers which can locate and play back any frame on the disk in less than a second are expected to cost less than $3,000—comparable to the cost of a CRT terminal. It seems to me that this kind of mass storage device deserves further exploration for those applications in library automation which utilize fairly static data. The dynamic and growing portion of the data base—additions, deletions, changes—might be handled adjunctively by floppy disks.

In general, where five years ago our choices for storage mechanisms were relatively limited, there is now a panoply from which to choose. That is not to say that the choice is any easier.

INFORMATION TRANSMISSION TECHNOLOGY

Now I would like to talk about advances in communications technology, for this is truly an incredibly exciting area, rich in possibilities. Changes in telecommunications technology are momentous and fundamental, moving rapidly beyond the technical sphere in their implications, involving our political and social fabric.

In contrast with five years ago, it is now possible to purchase services from a commercial packet-switched communication network. And there is a steady growth in computer-to-computer data traffic. Also, some computer manufacturers are offering network architectures which tie together multiple operating systems running on families of similar computers. But piecing together a cohesive network with dissimilar computers is still quite a challenge. Indeed, it is worth noting that computerized networking generally has not grown quite as rapidly as one might expect.

To some extent, the microprocessor has been a countervailing force against the rapid growth of networks. The driving force behind networking used to be a desire to share both functions and data. As small computer systems have become more powerful, more self-contained, more complete, they have also become more independent in their function. People are now buying small machines which can solve 90 percent of their problems and then proceed to redefine the remaining 10 percent of their problems as unimportant. There has been a noticable shift away from older network designs based on *functions* distributed across a hierarchy of computers with the most powerful computer at the center. Instead, in more and more designs, computational functions are redundantly located throughout the network, and internodal traffic consists of *data* transactions. In effect, data sharing, not function sharing, is becoming the primary network rationale.

I should also say, while we are on the topic of networking, that I have no doubt one can get carried away by the concept and lose sight of the fact that networking very definitely is not the only way to automate the library. When you buy a hand-held calculator you generally don't ask if it has networking capability. You buy it because it does its own particular job and it does it well. I have a feeling that a good many library automation applications, especially in technical processing, could benefit more from being implemented on well-designed, small, stand-alone systems than they could possibly benefit from being tied into a network.

But the big news in telecommunications, from the technological point of view, is that a fundamental and massive shift from analog to digital modes of transmission is taking place in the industry. This shift is taking place more rapidly than most observers had expected, and it is underpinned by new transmission channels of enormous capacity. The shift is massive in that it involves the replacement, or upgrading, of billions of dollars worth of common-carrier equipment alone. The shift involves all types of communications. Voice, facsimile, computer transmissions and television communications will all be affected. And the shift is pervasive—common-carrier dial-up facilities, leased lines, microwave communications, radio links, and satellite communications are all going digital.

For example, practically every major manufacturer of semiconductor circuits has begun to produce a device called the *codec*—short for "coder-decoder."

This circuit takes the human voice as transmitted by the standard voice-grade telephone channel, samples the signal 8,000 times per second, and encodes it into a digital bitstream. Digitized signals from hundreds of telephone conversations are then bundled together, transmitted over high-capacity communications links, decoded at the other end, and reconstituted into a very close approximation of the original voice.

While this may seem to be an elaborate and excessively complicated procedure, the switch from analog to digital makes good sense from a number of points of view. First, the cost-performance of digital circuits continues to improve remarkably. Noise problems inherent in analog devices can be eliminated. Moreover, by volume, more and more conversations are occurring between computers and other digital devices. What we are witnessing, in fact, is the emergence of a new entity: the intelligent communications channel.

The recent success of the Chicago Experiment, a high-capacity digital link using fiber optics now in its second year of operations, and implementation plans for Satellite Business Systems, a corporation which will provide broadband digital communications via satellite through rooftop antennas, serve to underscore the fact that it is not too soon to begin planning for broadband digital capabilities today. This fact also serves to highlight the relevance of videotext, interactive cable, digitized facsimile, and electronic mail. A new neural network of interactive communication is coming into place. Inevitably, new information relationships will result. Publishers may bypass their printers and transmit electronic text directly to the libraries. Just as likely, publishers may bypass the libraries and interact directly with the users. New institutions and new intermediaries may result.

But the *really* big news in communications is not in the technological arena at all, but in the legal and regulatory sphere. The emergence of intelligent communication channels has blurred even further the fine and convoluted line between communications and computing. At the heart of this is the fact that the communications industry is regulated by the Federal Communications Commission (FCC), while the computer industry is, depending upon your point of view, either a free-for-all or a monopoly, but in any event, unregulated. The battle will not be a small one. On one side we have AT&T eager to introduce more intelligence and computational capability into the telephone network but constrained from doing so by a consent decree. On the other side we have IBM, one of the partners in the Satellite Business Systems consortium, ready to supplant the existing network with a satellite-based digital network for high-volume business use.

In June of this year, the Communications Act of 1978 was introduced in Congress. It is the result of some twenty months of hearings and research by the House Subcommittee on Communications. The bill is vast in scope, goes into all phases of communications, and takes into account the rapidly changing technologies in the U.S. It marks the first effort in forty-four years to rewrite the communications laws of the land. Some of the things this bill provides are that it:

1. Abolishes the FCC, creating a Communications Regulatory Commission (CRC) with less regulatory authority.
2. Creates the National Telecommunications Agency as a policy-making body.

3. Deregulates radio.
4. Prohibits federal regulation of cable television.
5. Requires AT&T to divest itself of Western Electric, but
6. Frees AT&T to provide unregulated computational and other services through a separate company.
7. Replaces the Corporation for Public Broadcasting with a corporation whose function would be solely to provide grants.

These are just some of the things happening in electronic technologies. Indeed the time has come for the library community to bid itself into this picture and join forces with similar interests, to become part of an aggregated market, or to be left shaking dust off the books.

SOME PROBLEMS

I would like now to cast a somewhat wider net by looking at the context surrounding these advances in electronics and especially to ask about the process that turns these innovations into applications that can be of any use for libraries. One person's application is another person's component. To a materials scientist, bubble memory is a finished application carved from raw technology. To most of us, however, it represents a raw component waiting to be of service in a larger information technology application. Knowing that a grab-bag of electronic trinkets is at hand constitutes only so much intellectual baggage and clutter unless we also possess a strategy for fashioning useful applications from these trinkets.

Typically, software implementors, systems designers, management teams, and their organizations are responsible for formulating the information systems available for our use. While the fantastic advances in electronic hardware may kindle a sense of heady optimism, I think there is some cause for concern when you look at the state of affairs these producers are in. To comment briefly on each of them and their problems:

- *Software Implementors.* One effect of the astonishing advances in microprocessors and other hardware has been to reduce the significance of hardware as an element of cost in the final product and to cause corresponding increases in the significance of software as a cost element and area to be carefully watched. You might as well chase rainbows as find some new piece of hardware if your software effort is not under control. There have been recent attempts to formalize and better understand software engineering. In library automation, the complexity of the data structures, the obscurity of the procedures, and the heterogeneous nature of the marketplace make such attention to software especially important.
- *Systems Designers.* We seem to be dealing with a generation of *particularizers* and *specialists*—people who answer complexity with complexity, more interested in sadly shaking their heads, telling us why we can't do something instead of how we can; *t* dotters and *i* crossers, scribes of a forgotten tongue translating obfuscation into obscurity. One would think that systems designers and analysts would be more intent on cutting to the heart of a problem, seeing clearly with vision and insight the unifying threads, able to understand, diagnose, and prescribe solutions with a flavor of ingenuity. Instead, for the most part, petty practitioners punish us, intent on bringing us to the heart of a thicket and leaving us there.

• *Management.* I am reminded of a story from the banking industry to the effect that one banker, trying to impress another banker with his progressive and enlightened attitudes, explained that he had commissioned a comprehensive study of automation for all aspects of his operation. Just in case the seriousness of this were missed he added that the implementation work was expected to take fifteen years. One could almost hear him say under his breath, "By then, thank God, I shall have retired." For the most part, management seems intent on pointing to the promised land, but afraid to arrive; unaware of the process of technology transfer in which we are so vitally engaged.

• *Organizations.* We have not yet, or perhaps I should say I hope we have not yet, witnessed the final line up of organizations and players who might be responsible for bringing the technological revolution to the libraries. When I think of organizations, I think of risk. In theory, corporations, organizations, and institutions should be better equipped to take risks than the individual. Yet, in the case of library automation, we see an organizational archconservatism when it comes to planning for the future. But surely there are still greater risks in doing nothing, dangers in waiting for everything to clarify.

We live in a very dynamic world. Technology and automation do not always lead in the direction we might want them to. The opportunities and possibilities have never been greater than they are today. Alas, given our problems in software, systems design, management, and organization, the probability that we can shape these opportunities to suit our purpose is not nearly as great as it ought to be.

The Effect of Jarvis-Gann on Normal Life

Fay M. BLAKE: University of California, Berkeley.

The impact on library services of Proposition 13 and similar measures is briefly explored. Consequent proposals to charge user fees may threaten the entire concept of the free public library. Automation efforts run the risk of becoming a mechanism for spreading deprivation unless the implementors begin to distinguish and serve basic human needs.

I bring you greetings from the great and sovereign state of California, the state that brought you such unique culture heroes as John Wayne, Aimee Semple Macpherson, and Richard Nixon, and that now adds to its Hall of Fame two more redeemers, Mr. Jarvis and Mr. Gann. You may think that in the hallowed traditions established by George Murphy and Ronald Reagan, Jarvis-Gann is a new vaudeville act out of the west. Not so! Jarvis and Gann are the coauthors of Proposition 13, just passed overwhelmingly by the citizens of California, and I want to share with you some of the effects of Proposition 13 on libraries, librarians, and library users. I won't attempt to tally the number of hospitals no longer accepting patients, the number of convalescent homes already ordered closed, the number of school programs junked; just the effects on *library* programs. And I'm under no illusions about the perceived urgency of libraries in the lives of most people.

Proposition 13 has hacked off $7 billion in local revenues used for public services. Among the results for libraries are:

1. In Alameda County there are *no* public library services at all.
2. In Contra Costa County, the materials budget has been reduced by 80 percent—from $630,000 to $74,000, and the staff cut by 60 percent—all part-time and temporary positions eliminated, and out of 214 permanent positions only 93 are left.
3. In Los Angeles County, 1,100 people have been fired and 319 are left. There is *no* budget for materials or for central headquarters.
4. In the City of Oakland, 1,200 people in city services have already been fired, with more to go. Six library branches are being shut down; the remaining ones will be open two days a week; the main library will be open thirty-seven hours a week.

All interlibrary loans, all system reference services, all programming for children, all summer programs, all bookmobile services, all services to institutions—to the people in juvenile halls, jails, nursing homes, hospitals—

have ceased in most of the state's libraries. And most of the $5 billion in the state's surplus which is still being divided up will not be used for libraries.

Academic libraries are not immune from the effects of Jarvis-Gann, either. Most of the community colleges are cancelling summer sessions and closing down until the fall. Library services in the fall, even whether the colleges reopen, will depend on the distribution of surplus state funds. The California State University and Colleges system's budget allocation is being cut by 15 percent; a whopping $100 million cut has been suggested for the university, an immediate freeze on all wages, the elimination of temporary positions, and more to come. Davis Saxon, president of the University of California at Berkeley, announced that passage of Jarvis-Gann inevitably meant "reduced programs, reduced quality, reduced access" and almost certainly "could raise the question of tuition."

You will be happy to hear that thirty-eight states across the country have laws similar to Jarvis-Gann in the hopper and ready to go. Television news programs have shown us the beaming faces and busy fingers of taxpayers across the nation collecting signatures and conducting telephone campaigns for Proposition 13-type actions.

I can see the stony expressions on some faces out there and feel the restless movements of some of you as I speak. What, you are saying to yourselves, has all this to do with the subject of our conference, the state of the art—current issues of library technology? Well, even if the current state of public services in California had nothing at all to do with this conference and the people in this room, I'd still feel obliged to report what is happening and to ask your concern because you're human beings and because it's thousands of human beings out there who are losing their jobs and many more thousands who are losing public services that the richest country in the world and one of the richest states within it somehow seem no longer willing to provide.

But what is happening in California and what will be happening in many other states soon is directly related to one of the important current issues of library technology, and I want to direct your attention to it, to make you uneasy and to urge your active involvement in turning our society around from ruthlessness to compassion and from greedy individualism to intelligent cooperation. I want you to be thinking about *whose* technology you're developing.

You can believe that one of the first responses to the effects of Jarvis-Gann in California has been an attempt to institute user fees in the public libraries, and not just the kind that were already making steady inroads: transaction fees for interlibrary loans and for electronic data base searches. Now we're hearing such ideas as the proposed $150 library card fee per family in one county, or a variety of proposals for direct user fees for basic library services as well as for the use of meeting rooms and the rental of equipment, and increases in book rental fees and overdue fines; so many proposals, in fact, that the state librarian has just issued a statewide policy statement on fees: "According to the Department of Education's legal counsel, public libraries may not charge fees for basic library services to those who pay taxes for library support. I shall seek an opinion from the Attorney General's office. I suggest you delay decisions relating to fees until legality is established. I am unalterably opposed to fees for registration, loans, and reference assistance. Everyone has the right, and even more, the responsibility to be informed and educated according to his/her needs. Li-

braries are the source of information and education for everyone regardless of social and economic condition."

But what may have quietly died while we weren't looking may be the whole concept of the free public library.

Now, the charging of direct user fees in publicly funded libraries is an important current issue and one that needs extended discussion and intelligent and principled action, especially as the library crisis grows and as tax revolters attempt to slough off by law their responsibility toward the public good. The huge majority voting in California for Proposition 13 represents a small, effectively organized lobby of real estate and large commercial property interests fronted by mostly demogogic popularizers and appealing to a great many voters who are, on the one hand, realistically buffeted about and frustrated by unfairly devised and administered tax structures and, on the other, irrationally convinced that the poor, the ethnic minorities, the people who haven't made it are parasites on their overburdened backs, that we've already made too many concessions to them, and that they're in a fix because they really are inferior.

> So it was with a sense of some horror that the conference listened to California mayors describe their ordeal: Mayor Jack C. Moore of Hawthorn worrying aloud about defaults on the bonds the town floated, Inglewood laying off 170 of its 750 workers and closing down two branch libraries.
>
> All of this has deepened the cynicism of many black officials, who see the tax revolt as a product of middle-class antagonism against the black and the poor.
>
> "There's no question the basic factor is race," said Mayor Richard G. Hatcher of Gary, Ind. "What we have is an unfortunate combination—a feeling that taxes are too high and that the blacks are getting too much."[1]

The racist and classist elements in the American middle class, never too deeply suppressed, really surfaced visibly during the Jarvis-Gann campaign, and you can look to repeat performances in your own localities during the coming months. To such angry, frustrated, and irrational people, Milton Friedman, who actively supported Proposition 13, and his delusionary simplistic thesis—throw everything into the free market and let it sink or swim—are infinitely alluring. They don't want to hear that Friedman's free market never existed. They don't want to be reminded that Lockheed, that great emblem of free competitive enterprise, blackmailed the public into a $250 million loan to bail it out of bankruptcy. They want to forget that public services, police and fire departments, sanitation, education, and libraries, require the support of all of us in order that they may serve all of us. The guy who's just received an outrageous tax bill doesn't want to be told that the schools and libraries he's helping to pay for ultimately benefit him whether he uses them himself or not. And he's in no mood to wrestle with the concept that he will eventually suffer from the deprivations of our whole society if public services go down the drain. I'm finding it increasingly difficult to convince even librarians of this elementary fact as they, too, succumb to the rising ruthless tide of planned inequality. If you can't afford to pay for our increasingly sophisticated and expensive technology, tough! It's because you don't need or deserve it, anyway.

Our technology *is* increasingly sophisticated and much of it is not useful to a great many people, so what's wrong with allocating it on the basis of individual ability to pay? The reason the technology is not more useful to more people is precisely a direct result of its economic inaccessibility. Since our data bases

have been designed for a market rather than for needs, the overwhelming number of them provide access to information useful to business people, scientists, and technicians. In other words, the nature of the information collected has been changed. It has been limited, consciously or otherwise, to the kinds of information that would be bought and paid for. Who is collecting and programming an on-line job training or job availability data base, a tenants' legal rights data base, a prisoners' civil rights data base? Who'd pay for it? Certainly not the unemployed, the institutionalized, the poor. So, the more sophisticated our technology, the more limited its sale—not because all of us couldn't benefit from the information but because most of us can't afford to buy it.

In libraries this unexamined, tacitly accepted assumption is appallingly widespread. Russell Shank, incoming ALA president, said at the California Library Association last year, "Word is going around that the free library, that is, the publicly supported library freely accessible at no cost to the user, is doomed . . . . We may be experiencing a permanent shift in funding of social action programs from a tax on all for service to many, to a tariff to be paid by users for what will be a service to few . . . . Whatever we do we must not let the powerful new technology in the information service field slip behind the greenback curtain, there to be an exotic tool for the exclusive use of the well-heeled."

Let me contrast for you two radically different approaches by two university libraries to the allocation of a scarce resource—the composite skill required to discover and supply needed information. At the University of Illinois they've recently established the Library Information Service (LIS). "The basis of LIS," says a recent report, "is the conviction that most people are not able to use effectively the catalog, reference tools and other bibliographical resources of a large library." So at $15 an hour LIS does the job for you. The clientele served has not been university connected, for the most part. There is no indication how much of the indirect costs of the operation are being subsidized by the university, but obviously the basic source of information is the University of Illinois library, collected and paid for out of public money. At SUNY Albany, on the other hand, a system of appointments for reference service sorts out requests which will be best served by electronic bases, determines which data bases to search, distinguishes university users from outsiders, and involves users in the actual search. And the searches are free, except for off-line printing charges, because the searches are included in the reference department's budget. If Illinois expands LIS and adopts its fee-based service as a regular procedure, it will no doubt experience what study after study has shown. Fees, even minimum charges, drastically reduce the use of a service and reduce it not on the basis of urgency but purely of wealth: fewer students, fewer junior faculty, fewer faculty without grants. And you can't honestly believe that only rich faculty have legitimate information needs. Where an institution depends on fees rather than budgeting, it eventually needs to open its services beyond its own constituency, needs even to solicit paying customers, and eventually begins to tailor its services and its collections to the paying customers. Where free and fee-based services exist side by side, the minority with the checkbooks get most of the loving care and at a substantial cost to the majority.

Well, in a time of proliferating Jarvis-Ganns, what are the prospects for holding the line against direct user fees in publicly funded libraries? Not good, but all the more reason to explore diligently and quickly all available means.

The immediate need is for librarians to develop accurate, up-to-date cost figures for the variety of programs and services they offer. Budget officers will not be convinced to incorporate costs for expensive services unless we can argue persuasively the social value and the cost effectiveness of those services. Carefully designed and carefully monitored pilot projects, cooperatively developed by academics, funding agencies, and practicing librarians, can provide us all with ammunition.

But unless we can turn our economic philosophy away from the outworn dogmas of nineteenth-century competitive utilitarianism toward progressive and egalitarian regulation, we can't hope to continue to develop the public services we need. Librarians, in coalition with those in other service professions, would do well to draft and gather support for a long-term legislative alternative to user fees. In our nation steadily increasing productivity over the last half century has significantly reduced the number of people engaged in manufacturing. If we are to continue to absorb our population into the labor force, it must be in the continued growth of public services, and those can continue to grow only if we sensibly reallocate resources. We need to develop support for a fair, equitable federal tax on those industries which have shown a greater-than-average rise in productivity rate, a tax which would make evident the fact that an increased productivity rate is the result of the effective use of information. The revenues from such a tax should be transferred to those public agencies which provide information, libraries most obviously. Those industries which have increased their productivity rate above the average have done so by tapping the information made available, by and large, through massive public funding of research and development, and should, therefore, pay back a small share to the public information agencies where the information is collected, codified, and made accessible. If we fail to support and increase the public service sector, displaced labor will have nowhere to go and the chaotic disruption of the public service sector already devastatingly evident in California could become a widespread phenomenon.

Milton Friedman is not the only Nobel Prize-winning economist around. Another, Wassily Leontiev, warns us: ". . . in the long run, the ability of large masses of the population to benefit from technological advance will depend more and more on the direct transfer of property income derived from the ownership of capital and natural resources"[2]—the direct transfer of that income to publicly supported and equally accessible public services.

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Automation and the Library Administrator

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The development of automated systems in libraries is traced through three broad phases: developmental, operational, and integrative. Management reactions to these phases, as well as typical problems and failures, are characterized. Questions and challenges for management to address in the future are explored.

INTRODUCTION

"If you have the urge to automate, sit down and calmly wait for it to pass!" was a common piece of advice to library administrators in the mid-1960s. The news of large money expenditures, problems, and pitfalls spread even when system developers and administrators went to great lengths not to divulge such problems or mistakes. At the same time, computer specialists likening libraries to screw and nut inventory problems promised that our concerns were trivial; that library processing would occupy only seconds of computer processing time. Administrators were promised "instant computerization" of library functions as a remedy for problems of spiraling labor costs, increasingly complex procedures, growing manual files, and other ills.

While no library administrator involved with early automation efforts will claim it was easy, thanks to advances in technology, networking, and turnkey systems, examples of successful applications of computer technology to library processing and services abound. The computer has become a fast new tool, both in the backroom and in the front lines of patron service; it has brought greater flexibility, speed, and the potential for expanded cooperation and service. The computer has been a significant agent of change in libraries and we can be assured that future developments will bring even more dramatic changes and challenges.

Early soothsayers predicted an instant organizational, management, and service revolution to go along with the instant computerization—a new order of things. While there has been change, it has been evolutionary rather than revolutionary, and we have a long way to go. In looking at the impact of automation on administration, it is also important to remember that automation has not been the sole agent of change in libraries recently. Pressures for sound management practices and the need to manage for innovation as well as for the status quo have increased during the 1970s, including demands for greater accountability, pressures from the changing economic and social scene, inflation, staff demands for greater role in the management and decision-making process, networking capabilities and national developments, competing demands for limited resources, and a leveling or constriction of budgets.

The purpose of this paper is, first, to look at the changing characteristics of the development of automation in libraries over time; second, to examine the

reaction of management to these developments; and third, to list the management challenges for the future. For the purposes of discussion, the development of automation in libraries is divided into three phases:

1. *The Developmental Phase*—The period through the early seventies, characterized by system experimentation, development, and entrepreneurship in a limited number of institutions around the country.
2. *The Operational Phase*—The period beginning in the seventies through the current time, characterized by system sharing and electronic networks, vendor supplied systems, competition, and broad library participation.
3. *The Integrative Phase*—The period emerging now and going into the future, characterized by the integration of systems across functional lines, the definition and implementation of national networking capabilities, greater cooperation, a more substantial impact on processing and service capabilities, greater information industry involvement, and continuing technological innovation.

THE DEVELOPMENTAL PHASE

In planning for automation, library administrators counted on a number of effects: speedier and simplified processing procedures, greater sharing of bibliographic information, improved access to collections, and reduced staffing. In general, the practical goals for automation were (1) to do what was currently being done better, faster, or more effectively, and (2) to provide services and products that were infeasible or impossible with the manual system. In addition, many hoped that this would be a period of research into the applicability of computers to help libraries achieve their missions, unfettered by many of the constraints imposed by manual systems.

The period was characterized by generous foundation and government funding for several large system development projects in individual libraries throughout the country, numerous small automation projects in individual libraries, little interaction or coordination between development projects, and substantial schedule slippages.

The concept of total system design was alive in the literature, but, with only a few exceptions where systems were indeed designed with the totality in mind, applications were typically restricted to one or a few functions. The prime candidates were serial processing and lists, circulation, acquisitions, and book fund accounting (and occasionally cataloging), depending on pressures being felt in the institution, the interests of library management, the interests of funding sources, available expertise, and the computer facilities or services available.

Just as we lauded the potential situation in which a book would be cataloged just once in the country, the management hope for system development during the period was that a system developed once at one institution could be transferred to another institution. This management dream was thwarted on a number of counts. Hardware and software operating systems differed from place to place. Library application programs were integrated into computer systems in various ways. But more importantly, libraries did not agree on a standardized way of doing things. An output format found quite acceptable at one institution would be found woefully lacking by the staff at another institu-

tion; a data element deemed essential by institution X would be scoffed at by institution Y, and so on. At each library, the application of automation even to similar functions appeared different and incompatible.

There were two significant national developments during the period: the MARC Pilot Project and the initiation of the regular MARC subscription service. These developments established for the library community an exhaustively complete, standardized bibliographic record content and format definition for the communication of bibliographic information that could still be utilized by the individual institution to fit local processing requirements and priorities.

Several challenges faced management in planning for this new tool. First, the technology itself was evolving rapidly. A 1967 White House report on computers in higher education begins with the statement that "after growing wildly for several years, the field of computing now appears to be approaching its infancy."[1] Management inclined to pursue automation was faced with making decisions without the benefits of personal expertise or prior experience in the midst of rapid hardware and software changes and technological developments. Expert computer advice was available but suffered from both ignorance and underestimation of library requirements and the same rapid technological changes.

Second, there were few librarians trained in the new technology. Therefore, the application of computer technology required the integration of expertise from three different groups of people: librarians, programmers, and computer experts. Finding no immediate common ground of terminology, priorities, or concerns, the seeds of miscommunication, misdirection, and misunderstanding flourished. Salary scales, work habits, work hours, and views of the work to be done varied widely between library and computer personnel, with library managers expected to play referee and interpreter.

Organizationally, a common management decision was to create a systems office, populated by systems analysts and programmers given the responsibility of designing, testing, and implementing the computer application in the library. On the positive side during the developmental period, this brought the people charged with automation together in one place in the organization. On the negative side, the isolation occasionally fed the suspicion of the staff, caused miscommunication, and often led to a situation in which the systems staff ignored the real requirements and priorities of the library. The concentration of responsibility in a systems office frequently robbed the line manager of the opportunity to understand the automated application in the context of the total operation of the unit or department. In addition, the majority of the time, library management did not possess the expertise to properly direct or evaluate the system development effort. Unfortunately, the result was often an autonomous systems staff.

Third, change is ideally predicated on a long-range plan, a thorough knowledge of the present system in totality—including procedures, files, historical precedent, and resource allocations, and a method for evaluating the change. Regrettably, there were numerous management failures during this period: (1) failure to clearly articulate the goals and priorities of the organization; (2) failure to fully understand the current system that was to be modified by automation; (3) failure to analyze costs of the manual system prior to automation as a benchmark against which to compare the costs after automation; (4) failure to

develop evaluation techniques to measure the efficiency or effectiveness of the automated systems; and (5) failure to establish an ongoing methodology for monitoring costs.

Fourth, resource allocation (always difficult at best) became a real challenge. Most early automation efforts resulted in no staff savings, requiring that automation development and operating costs come from other sources, including local institutions, the government, foundations, or reallocations from other areas in the budget. The challenge to the library administrator was not only to explain to funders and higher administrators the potential benefits of automation, but also to educate them as to how a library works. The real costs of computer processing in library applications were virtually unknown by library administrators making decisions to automate. Budget estimates repeatedly evaporated in a sea of red ink as libraries learned more and more about the job to be done and as computer experts learned that library requirements were different from industrial inventory applications. Additionally, influxes of grant money and "free" (contributed) computer time from local computer facilities distorted the real potential impact on the operating budget.

The myth was still very much alive that automation would save money. As this myth turned to smoke toward the end of the period, the management argument turned to increased services rather than cost savings. To some, the argument of dealing with spiraling costs for the future (slowing the rate of rise of costs), rather than cost saving in the present, became an attractive alternative way of justifying automation in libraries.

Fifth, management attempts to utilize information from other libraries engaged in automation efforts usually proved impossible because of different system designs and requirements, different data elements and data bases, different computer center charging algorithms, hidden charges, internal money transfers, differing products, and so on. The automated bibliographic wheel was reinvented at each library; meaningful comparisons were nearly impossible.

Sixth, more than ever before, the dedication of management to communication (up and down) was essential and never were the cases of abysmal failure more prevalent. Out of ignorance and fear of the unknown, typical resistance to change, and skepticism about the benefits of the computer and the interests of the systems analyst and designer in their real requirements, the staff waited to see what the result would be. Where communication was open and frequent, where the operational staff was consulted, and where training was constant and thorough, the chances for a successful implementation increased dramatically. Where these actions on the part of management did not take place and staff resistance built up, change was made more difficult, if not sabotaged altogether.

In summary, it was a period of trial and error, experimentation, and learning. By and large, the new technology touched few libraries and, in these, the change touched only small segments of the total library operation. Where it did touch, there was frequently not a revolutionary change. As a matter of fact, in many cases, the automated systems were merely superimposed on existing manual systems with little change or true integration.

The local focus on development allowed the system designers to tailor the system design to the local environment, without changing local idiosyncrasies or procedures, even when these were inefficient. On the other hand, a fre-

quent cause for frustration in the library was the computer experts' dismissal of our requirements with the observation that "the computer can't do that." Often, library management never asked, "Why not?"

Also as a result of local development, capabilities were programmed around the country to take MARC records and massage them to fit local conventions. Decisions to deviate from the MARC content and format were the rule rather than the exception, causing problems with interinstitutional information or system sharing. The siren call of cheap, very fast computer manipulation of information caused libraries to believe that the perfectionism attempted in the manual system could be finally achieved, without additional cost. For example, failure to understand the real costs of automation led the library community to specify every conceivable piece of information in the MARC format without asking what the price tag would be; we are still paying the price of that completeness in our systems of today.

A backward look into the times reveals an agonizing lack of leadership and planning on the part of library management. Managers trying to cope with change and many unknowns abdicated, in my view, their responsibility to give a sense of direction to the internal organization or to exert control over the external agents of change. The technological tail wagged the library and bibliographic dog. The staff tail, wedded to historical procedures and practices, wagged the development dog. Managers struggling with the new technology failed to follow the basic steps of systems analysis and development or the rational decision-making process in which change is made in the context of goals and priorities and the long-term view. Facing the prospect of staff resistance to change, the temptation to program the manual system was unbearable for many managers. The failure to comprehend the potential impact of automation on traditional procedures and services and the resulting failure to take full advantage of the new tool is evident in our systems of today.

THE OPERATIONAL PHASE

The benefits of automation hoped for in the 1960s were still needed in the 1970s. It was clear that the challenges of continually escalating labor costs in the manual environment could not be met merely by cutting staff; while efficiencies were undoubtedly possible in the majority of manual systems, gains in efficiency alone could not hope to meet the challenges faced by libraries. The social and economic pressures building during this time, the end of the era of unprecedented growth in libraries, the need to compete more aggressively for resources, and a society accustomed to technological advances, brought the necessity to automate into clearer focus for most library administrators.

It was during this phase that libraries witnessed the development of successful networks, the sharing of computer systems, proven on-line applications, turnkey library systems, vendor-supplied automated capabilities, minicomputer applications, the promise of microcomputer applications, and greater competition among systems. The earlier management prospect of having to replicate systems developed at one institution in another was largely replaced by the capability to share hardware, software, and data bases. With the availability of choices and advances in the technology, it was possible to differentiate those library applications best handled cooperatively with large data bases, such as cataloging, from those high-transaction-volume, specifically local applications,

such as circulation, which could be handled in-house by stand-alone systems.

As a result, libraries of all types and sizes that were unable to invest the horrendous financial and human resources necessary to undertake system development efforts could now utilize this new tool. For library management, the risks were now less, there was more flexibility, there were choices, there was an ever-growing community of libraries utilizing similar or the same systems, the mystique surrounding computer systems was reduced, and the general acceptance of the capabilities of automation was increasing throughout the ranks of the profession. Accordingly, and in line with other pressures, the challenges involved in the management of automated systems shifted from development to implementation, integration, and greater staff involvement.

• *Technical Knowledge.* The developments in automated library applications have become such that the technical knowledge required for intelligent decision making is well within the capabilities of virtually every library manager. Rather than having to rely solely on outside experts, we have in libraries of all sizes and types a growing number of managers and staff able and willing to specify needs, evaluate alternatives, and make decisions. As a result, in many libraries there has been a shift of responsibility for system definition and implementation from a systems department or outside experts to those line managers ultimately responsible for the integration and operation of the new system. Larger libraries engaged in local system development still often utilize systems departments of experts, but the clear and welcome pattern of greater involvement for the line manager and staff seems to be an established one.

Except for a certain level of expertise and understanding required to evaluate computer capabilities specifically, the management planning and decision-making processes involving automation have proven to be identical to those necessary for other change factors requiring rational decisions—the accountability for managing the change so that it matches the needs, priorities, and goals of the organization is the same and clearly resides ultimately with the library administrator.

• *Decision-making Process.* The successful introduction of any change involves the development of a consistent, logical process and framework for short- and long-term planning and decision making. The essential first step in this process is the preparation of a clear statement of goals, objectives, and priorities for the organization as a whole, including specific goals and expectations for the area to be impacted by the change. This plan should be formulated only after (1) wide consultation in the internal environment; (2) wide consultation in, and education of, the external environment; (3) a thorough analysis of the current environment, including bottlenecks, constraints, limitations, and inadequacies; (4) a clear understanding of current resource allocation decisions and current costs; and (5) a carefully prepared statement of the anticipated impact of automation on the organization.

Based on the analysis, it is possible for library administration to identify appropriate steps and choices. Assuming the decision is to apply new technology, the next step is to prepare a comprehensive statement of requirements, expectations, and priorities for the automated application, conducted with an air of imagination and creativity so as to fully utilize the automated capabilities, with an air of questioning tradition-bound procedures, and with a goal to supply capabilities for the library and its users impossible in the manual system.

The third step in the management process is the evaluation of all available

systems against the stated criteria. Once the choice is made, the organization must construct a detailed implementation plan, a timetable for implementation, and a statement of formal organizational structure in which to make fullest use of the factors of change. Meaningful staff input to the process is essential, as are truly effective training programs and a two-way communication environment. Finally, this whole management decision-making process must take the whole organization into account, not just the segment of the organization involved in the change.

Unfortunately, examples of management failures to follow this logical process persisted in the 1970s. One of the most important steps—to define an ongoing, efficient mechanism for feedback, evaluation, and improvement—is one of the most neglected. So often, the tendency is to think that the system of today will remain unchanged over time, yet we know that technology and our utilization of it will certainly evolve and change. For this evolution to be effectively guided, it is essential to monitor the system, provide a feedback channel, evaluate the system's performance against changing requirements, and factor improvements into the ongoing system.

- *Buy or Make.* The decision to make or to buy an automated system is still a very real one for libraries. The management process to build, or have built, a system is similar to buying into a network or a turnkey system, but additional specifications must be prepared for system and vendor performance, hardware, system and user test procedures, error correction, system maintenance, implementation, evaluation and future improvements, and penalties for vendor nonperformance.
- *Competitive Bidding.* Many library managers face the requirement for competitive bidding in the choice of systems. Where it is desirable or mandatory, the preparation of a request for proposal (RFP) or request for quotation (RFQ) is an important management responsibility. Since these requests constitute specifications for what is needed, their preparation requires extreme care in order to ensure that all requirements are fully and unambiguously stated, according to the statement of the organization's plan, goals, and analysis of needs. In both substance and process, management has to evaluate the bids so as to comply with legal requirements. The evaluation process consists of a number of steps, starting with the determination of each bidder's qualifications, the extent of the bidder's compliance with the request, an analysis of costs, and the applicability of the suggested system design or configuration to the existing organization and staff. While a numerical scoring process to evaluate a bidder's promises to meet requirements is a useful tool, decisions of this magnitude cannot be decided purely on the basis of numerical scores or lowest cost. Management must factor judgment and nonquantifiable considerations of significant issues into the decision-making process. For those libraries wishing to use a numerical scoring system as one component of the evaluation process, there are numerous computer programs and consulting firms available to aid the decision maker.
- *Management Techniques.* The opportunity for library management to make rational decisions based on a logical process has always been present, but during this period there has been a proliferation of articles and conferences on how to apply decision-making and evaluation techniques from other disciplines in managing change in the library, including operations research, cost–benefit analysis, management by objectives, theory X and theory Y personnel manage-

ment, socioeconomic factors of motivation, and many others. In addition, a number of self-analysis techniques have appeared within the last several years, designed to provide a systematic internal review of a library's organizational and management structure and functions. MRAP (Management Review and Analysis Program) is an example for the large institution; less exhaustive versions and variations exist for the smaller library.[2]

The challenge for management is to apply the technique that best fits the situation; to choose a technique that fits the resources available; and to choose the simplest technique, or a collage of techniques, that will get the job done. Forgetting the chaotic consequences of the failure to use any recognized management techniques for planning, we have many examples of the other extreme, namely "overkill." The national network could probably be funded if we had a dollar for every elaborate study, every committee report, or every pound of statistical data compiled as an aid to a management decision that went unused or provided no real assistance in the process. Almost as much care is required in the choice and process of analysis and evaluation as in the decision itself. Occasionally, half a day of intelligent, directed analysis is a perfect substitute for five or six day's work, if the manager knows what he or she wants and needs and takes the time to define it. Library managers must make some fundamental decisions about the allocation of their time. It is not sufficient to manage for the status quo or the short-term future. Yet, we all know that these concerns can fully occupy every waking hour. What is required is a decision to allocate time for the long-range planning that is essential in order to influence the process of change and not merely react to it.

- *Communication and Staff Involvement.* The introduction of change, to be effective, requires a management dedication to (1) involve the staff in the definition of requirements and the implementation of the system and (2) provide training so that they fully understand the system, its role in the mission of the library, and their role in making it run. Experience and common sense indicate that a properly trained and motivated staff can provide imaginative and dynamic ideas for change and the utilization of new resources that rival those of most outside experts. Staff members today are looking for job satisfaction and a share in the objectives of the organization, based on mutual trust and confidence with library management. It is management's responsibility to provide opportunities in which this kind of staff participation and involvement can grow and flourish.

- *Impact of Automation.* The utilization and impact of automation has varied significantly among libraries. Some have increased staff, some have decreased staff, some have stayed the same; some have realized the goal of processing more material with the same staffing level, some have not. The difference is dependent on a number of factors, including conditions before automation; staffing levels before automation; the attitudes, interests, and philosophy of library management; and the extent to which the staff has been prepared or encouraged to deal positively with the change.

A major technological reason behind these differences has been the flexibility of the automated systems. Almost without exception, automated systems and networks have allowed each participating library utmost flexibility in the use of the system, allowing a library to perpetuate local idiosyncrasies and procedures if it wishes. Given this degree of flexibility, it has been utterly possible to use

the automated system as inefficiently and ineffectively and with as little knowledge of what is going on as with the manual system.

In summary, in contrast to the earlier period of development involving a small number of libraries, during the seventies there has been a widespread application of computer systems in libraries of all types and sizes, thanks to advances in on-line technology, communications, and networking. As a result, the emphasis for management has shifted from entrepreneurship and systems development, design and experimentation, to system specification and choice, implementation, functional integration, measurement and evaluation, and greater interlibrary cooperation and sharing.

The new technology has created a challenge for management that has taxed planning and decision-making skills; however, the technology has not produced a revolution either in the way libraries go about their business or, to much of an extent, in the ways in which patrons are served. We have not simplified the procedures for or interaction with the bibliographic apparatus; instead, the automated systems are as complex as our previous manual systems. In general, staff savings have not been realized as a result of automation, nor have libraries really tested the hypothesis that the same staff could process more materials due to automation, since the era of unprecedented growth came to an end as the operational phase began. The rule rather than the exception is still to view automated capabilities as one-to-one replacements for manual systems—as an opportunity not only to perpetuate local variations but frequently to consider more of them, given the speed and apparent ease afforded by the computer. By specifying multiple, exhaustive MARC formats and applying them to retrospective as well as current records, we have failed to examine cost as a function of benefit for the retrieval of library materials. Years ago when systems were first designed, we failed to ask whether the abundance of data we specified was required and whether we could afford it. Rather than using the computer tool to create new ways of doing things, we applied it to our historical practices with little creativity. It is still too early to tell what price we have paid for those decisions.

As we find more functions in the library that can be efficiently and effectively automated, including some front-line services to patrons, our challenge is to integrate these parts creatively into one compatible whole which is greater than the sum of the parts. As a group, however, I maintain that we have rested too comfortably on past accomplishments; we have had insufficient influence on network managers or designers concerning the priorities or schedules of future developments; and we have been so happy to see the successful application of on-line networking to the cataloging function, for example, that we have failed to plan sufficiently for (1) other applications, such as acquisitions or book fund accounting, (2) bibliographic control of collections other than monographs and serials, (3) the ripple effects coming from our current systems, (4) future technological developments, (5) the integration of applications, or (6) the potential impact of these developments on the role of the library in a changing society.

THE INTEGRATIVE PHASE—CHALLENGES FOR THE FUTURE

It is reasonable to assume that technological advancements and pressures for sound management and accountability from the changing economic and social

scene will continue, and may well affect more aspects of our business or raise more questions of our relevancy in society than developments to date. In all probability, the changing situation will put the traditional library into greater competition for resources and with other segments of the economy for the control and delivery of information. For the future, library administrators will have to deal with the ripple effects arising as a result of current systems, networks, and national planning, and plan for the future with full recognition of past accomplishments and failures. The limited growth expectations for book, materials, and building project budgets, plus developments in national network planning, will result in greater reliance on information about holdings of other libraries as recorded in the bibliographic data bases available on-line throughout the country. The opportunity for more systematic acquisitions decisions based on knowledge of other collections, and the multilateral agreements for cooperation and resource sharing that will follow, will have an impact on internal procedures and priorities. A major impact involves the collection development function, where decisions must be made about in-house holdings versus materials of potentially lesser use that can be gotten through a cooperative arrangement. In turn, this instant access capability will affect (1) patron service goals, (2) views on ever-expanding collections and collection-development policies, (3) views on centralized, shared storage facilities for lesser-used materials, and (4) space needs and plans for new library buildings.

These effects will result in an impact on our interlibrary loan functions, which will have to accommodate the increased traffic of both borrowing and lending transactions. The load-leveling effect of multiple locations shown in bibliographic data bases may offset the burden currently borne by a few large collections, but the extent of that impact is not yet known. In all probability, current interlibrary loan staffing patterns will not be sufficient to handle the increased volume likely to build as on-line systems are used in collection development and acquisitions decisions. This will necessitate a shift of resources to the interlibrary loan function, since speed and accuracy will be required to make the system of resource sharing work.

Another major ripple effect is the strain on large collections heavily used by other libraries, where the priorities of handling local needs must be juggled with the needs of other libraries wishing to borrow books. When these problems are solved, libraries will still be faced with improving both the communication of interlibrary loan requests and the physical transportation of the materials. Unless we can deliver the material in a timely fashion, the speed of access to location information in on-line systems is for naught.

An inevitable outcome of the efforts to date is the replacement of the three-by-five-inch card catalog in the local library with an on-line catalog, either centrally maintained on shared equipment or maintained locally on a stand-alone system. Unless we are fooled into accepting merely a machine equivalent of our unwieldy, increasingly difficult current card files, the on-line catalog with its multiple access points and capabilities for Boolean search operators will revolutionize the use of the catalog as a bibliographic tool, our reference service, and our interaction with the patron. As we try to learn from the past, it is distressing to note that the on-line catalog (frequently viewed as a one-to-one replacement of the manual file but utilizing a different medium) is more often heralded as a way to reduce filing costs in the manual card files than as a re-

freshing, dynamic new tool for access to the collections, with the potential of being integrated with other capabilities to form a total library system.

Challenging questions of resource allocation remain. Capital and operating costs of automation must be offset by staff savings, budget increase, reallocations from other areas in the budget, a charge for services, or a combination of these. For example, if libraries are to support the costs of patron access to on-line catalogs once the card catalog is closed, there must be a shift in resource allocation from manual filing and maintenance to the costs of building, maintaining, and operating the on-line catalog. If the shift does not result in savings, libraries will have to face reallocations from other parts of the budget, charge fees, or argue for a budget increase. The fee-for-service controversy already sparked by the issue of charging for computer literature searching may well be just the beginning as we face the on-line catalog, full text retrieval capabilities on demand through a computer system, and additional capabilities that may come about in the future.

With enhancements in on-line systems and the emergence of vendor-supplied systems, we can look forward to significant changes in our way of acquiring material. Some libraries are already electronically ordering material from vendors and there is no reason to believe that this capability will escape general library use. Advances in direct communication with the vendor, plus the on-line catalog with authority control and electronic interlibrary loan switching and accounting and an interface with circulation systems, will have a substantial impact on library operations. As these developments unfold, it is essential that library management plan for a true integration of automated capabilities across functions, ask hard questions about the long-term cost–benefit tradeoff of decisions, question historical sacred cows, establish effective communication links with staff, and take a more aggressive role in shaping capabilities, schedules, and priorities in future network and national planning developments.

In summary, we have assumed that libraries are a societal good beyond question and have immersed ourselves in detailed questions of bibliographic access and control without regard to possible shifting trends and priorities in society. In an era of tax revolution (as witnessed in California by the passage of the Jarvis proposition), libraries cannot assume automatic public support. Library administration must assume an outspoken and dynamic leadership role in the definition and development of future capabilities utilizing the computer and must do so with imagination, questioning, and real attention to priorities. Management must provide direction in selling funders and taxpayers on the role of libraries in the society and the importance of the new technology in this task. And most importantly, we must understand the real requirements of the user—one of our most critical reasons for existence.

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An Update on Micrographics

Carl M. SPAULDING: Council on Library Resources, Inc., Washington, D.C.

Micrographic developments as they relate to library automation systems are reviewed. Included in the discussion are relevant publications, applications, hardware, software, and films. Some observations are made on the competitive market situation characterizing the industry.

INTRODUCTION

The remarks which follow are neither a state-of-the-art report on COM and its library applications nor a tutorial on the subject. The former is more than adequately done in a report referred to below, and the latter would be inappropriate for this journal. Instead, this article capsules a list of recent happenings in the micrographics field that have significance for library automation and systems people. In other words, it constitutes an annual review statement, or update.

THE LITERATURE

Some publications merit comment, two from the same pen, that of Dr. William Saffady of the School of Library and Information Science at SUNY Albany. The first of his works, *Computer Output Microfilm: Its Library Applications*, has just come off the press with the American Library Association imprint, having been researched and written under a Council on Library Resources grant. It is a thorough and excellent up-to-the-minute report. Chapter headings include "COM Hardware and Software," "COM as a COMputer Output Alternative," "COM Systems Design," and "Links to Other Systems." In addition there are several highly useful appendixes and a glossary, the latter being effectively positioned immediately following the table of contents. The illustrations are models of clarity.

Saffady's other new book, *Micrographics*, a text developed for his own classes, is, despite some imperfect details, the best work of its type to come to my attention.

The Winter 1978 issue of *Micrographics Equipment Review* is devoted to Paul Napier's evaluations of the two motorized roll film readers developed specifically for library catalogs. This is must reading for anyone considering a COM catalog; the author discusses a good bit more than the mechanical characteristics and features of reading machines (or "terminals," as the manufacturers are wont to call them).

COM CATALOG READERS

With regard to the two specialized reading machines mentioned above, it is worth noting that they are functionally quite similar although mechanically quite different. While the mechanical differences are important to potential purchasers, the fact that both machines lay out a catalog as one continuous string of entries means that searching is sequential and, therefore, involves a maximum of winding film back and forth. In addition to the time this approach takes, it also imposes serious equipment design problems, particularly for large catalogs. Equipment design problems are usually reflected as extra cost and/or as decreased reliability in the final product. Therefore, it is worthwhile to think about other ways of formatting the catalog on film and thus changing the machine functions.

One alternative formatting for which hardware has recently been implemented is that of a scroll of film 105 millimeters wide and up to 200 feet long; i.e., a very long microfiche. This allows a searcher to move a relatively short distance along the length of the film until internal indexing indicates that the proper column has been reached. At this point the searcher moves the film sideways while searching the column for the desired entry. The reading machine referred to here is the Bell & Howell SR 1632. It was developed for an automobile parts catalog application and is about to undergo large-scale field testing by General Motors. The 42× lens allows the SR 1632 to accommodate film of up to 48:1 reduction, which reduces the amount of sequential searching by a factor of approximately fifteen and at the same time greatly increases the length of catalog that can be stored in a single machine. The SR 1632 also incorporates a large (thirteen-by-twenty-inch) screen and an automated search mechanism controlled by an alphanumeric keyboard and hardwired for specific applications. The fly in the ointment is, as might be expected, price. Currently the device is available for about $2,800 in unit quantities. Nonetheless, the basic design is simple enough that it, or functionally similar machines, could be available at appreciably lower prices in time. One such similar machine is known to be well along in development.

OTHER NEW READING MACHINES

A COM microfiche reader worthy of comment is the improved Realist Valiant FP-14 with an opaque screen which can be set to four different positions, thereby adjusting for a variety of ambient light conditions. This reader also has a tinted, transparent shield in front of the fourteen-by-eleven-inch screen to reduce dust accumulation, and is available with either single lens mount or dual lens slide. Other features of the FP-14 are a floating lens system, self-opening fiche carrier, convection cooling, three levels of illumination, and lenses of 24×, 42×, and 48×.

Xerox has finally brought out a successor to the microprinter in the form of a self-contained microfiche reader/printer, the model 740. Almost everything about the 740 is an improvement over the microprinter; the price (about $3,700), image quality, and ease of use all are admirable advances which Xerox has owed its customers for a long time. The 740 can be delivered with either positive-to-positive or negative-to-positive polarity, but cannot be switched between the two after delivery.

A reader/printer that can be switched from one polarity to the other by the

push of a button is the exceptional new Minolta RP 405, which not only is a machine of unusually high quality but also is one having a large number of standard features and optional components. Standard features include a multiple copy switch for one to twenty copies, roll-fed paper supply in two widths, variable-length paper cutting, fully rotatable image, drop-in lens mount, and variable contrast control. Important among the optional features are interchangeable platens for fiche (one- and two-fiche models), roll film (manual or motorized) and motorized cartridge models, and fifteen different lenses from 8× to 45×. The truly remarkable thing about this machine is that everything about it works well, the interchangeable platen arrangement included. The tonal quality is good even immediately after switching polarity. Typical configurations cost from $2,500 to $3,500. The RP 405's only significant shortcoming is that it uses coated paper. Users of the RP 405 have experienced some difficulty with compatibility of paper and toner.

OTHER MICROGRAPHIC EQUIPMENT

A few years back there was a rash of incidents in which card catalogs were vandalized or otherwise damaged. Consequently a number of library catalogs were microfilmed for security purposes. In most instances filming was, for economic reasons, done with a flow camera, a procedure of dubious merit because the film images were often relatively poor, especially for typical catalogs of variable graphic quality. Also card images are often skewed relative to the film, making automatic cutting of copyflo copies impossible when it is desired to reproduce the cards after a disaster. Until quite recently the alternative to the flow camera was the planetary camera, but it is a very slow and expensive way to film a catalog because it requires manual placement and pick-up of cards.

Several years ago University Microfilms, Inc. (UMI) announced a special camera, the Cardcam, which provides a good compromise between the speed of the flow camera and the image quality of the planetary camera. Enough time has now passed to be able to say that the Cardcam works reasonably well. Several large catalogs have been filmed at acceptable cost and with acceptable results. UMI now has a second-generation Cardcam which features improvements over the original model. UMI also offers reformatting service by means of a composing/reducing camera which converts the roll film output of the Cardcam to other reduction ratios on roll film or fiche. This new system may be useful to libraries planning to put their prospective catalogs on COM film and needing a means of dealing with the portion which is not in machine-readable form. (The composing/reducing camera can output film at ratios equivalent to COM ratios.)

At this year's National Micrographics Association conference, Planning Research Corporation (PRC) exhibited a piece of hardware that many have been waiting to see but few to buy, at least for the present. The Telefiche System converts roll film and microfiche to digital information, transmits it to a distant site, and reproduces it on a CRT terminal and/or printer (plotter). Two printers are available; one will reproduce a frame in ten seconds, the other in about thirty seconds. A faster version of the first of these is undergoing reliability testing. While the Telefiche System has much promise, it is very expensive, a typical configuration for two-way transmission priced well in excess of $100,000.

An interesting development in COM recorders is the offering by Bell & Howell of a 72× reduction ratio as an option on its equipment. Two other ven-

dors offer 72× output and one of them has experimented with 96×. The meaning of 72× reduction is not simply that it saves dollars by packing more than twice as much information on a fiche as a 48× reduction; more important is the lessened requirement for loading and unloading fiche from a reading machine. This end is achieved with some reading machines by use of platens that hold two fiche. Higher reduction ratios are necessarily accompanied by lower quality, particularly in the linage displayed on the reader screen. Nevertheless, it seems likely that 72× and even 96× may be used a good bit in the next few years.

MICROFICHE POPULARITY

Higher reduction ratios, two-fiche platens, and other improvements to microfiche readers are one set of factors contributing to the increasing popularity of microfiche. Other factors are much lower reading equipment costs; the convenience of storing, handling, and mailing fiche; and the fact that fiche can be quickly and relatively inexpensively duplicated at user sites. The synergy of these characteristics is bringing about a continuing swing away from roll film for most COM applications. One of the few exceptions to this trend is the library's COM catalog. It is difficult to predict whether this exception will hold in the face of the lower cost and higher reliability of fiche readers.

Not only are fiche generally becoming more and more popular, a new type of microfiche, the "updatable" fiche, is becoming big business. The updatable fiche is produced on a kind of film that can be exposed and developed a frame at a time. The utility of this type of medium is for files which must be added to over time and which are costly in terms of the storage space and equipment they occupy in paper form. Equally important in many applications is the file integrity which can be effected by always retaining the master fiche in the records center and furnishing inexpensive duplicates for work copies. The military services, being particularly concerned about file integrity and privacy for their personnel records systems, are all going to microfiche systems and mechanized or automated retrieval devices. The Marine Corps is utilizing a bay of large automatic fiche retrievers in conjunction with A. B. Dick/Scott System 200 updatable fiche and cameras. On the other hand, the navy's system uses power files (motorized but not automated) and strip-up fiche which are updated by physically adding and removing individual frames or short strips of film. The contractor for the navy system has developed a rather expensive machine for applying the bits of film to the plastic substrate.

As floor space and filing cabinets become more expensive, updatable fiche are almost certain to become more popular. Bell & Howell is now in the market with a film that not only has "add-a-frame" capability, but also is erasable a frame at a time. Another competitor, 3M, expects soon to offer a third updatable medium, called ovonic film. It, too, is erasable.

THE BATTLE FOR SALES

This three-way competition shaping up between A. B. Dick/Scott, Bell & Howell, and 3M is typical of an industry noted for its competitiveness and secrecy about production and sales statistics. Since no one really knows the total annual dollar volume of the business, there is much preoccupation with estimating last year's volume and predicting next year's. The opportunities this

provides for creative pronouncements was illustrated this year by the public statements of two executives of micrographics companies. Edward T. Keating, president of Datagraphix, the largest manufacturer of COM recorders, said relative to growth potential of COM equipment, ". . . excellent, although the rate of growth will change." Dr. Robert W. DeGrasse, senior vice-president of Quantor, a competitor of Datagraphix, predicted, ". . . a continued 25 percent compounded growth in sales for COM recorders for the next three years . . . ." Whatever the quibbles, it is clear that the industry continues to enjoy good times and sizable annual dollar gains.

The reality of the gloves-off fight for the micrographics buck came home to libraries this year when a manufacturer of COM catalog readers initiated suit against a county government over the way in which a contract for more than $300,000 worth of readers was decided.

Another indication of the maturing of the COM industry is the current count of companies marketing recorders. Competition has whittled this number to six: Eastman Kodak, 3M, Bell & Howell, Datagraphix, Information International, and Quantor.

Although manufacturers of micrographics equipment are notably tight-lipped about sales statistics, an enterprising publisher, Micronet, has found a way to develop figures on a sizable chunk of the federal government's purchases of micrographics goods and services. Micronet has published a report extracted from General Services Administration (GSA) documents which detail all GSA purchases of these items for the period July 1976 through December 1977. The Micronet report shows that of GSA's COM recorder purchases, 60 percent were from Datagraphix and only 9.2 percent were from Eastman Kodak. Even more surprising was the revelation that $19 million of GSA's $80.7 million total expenditures for micrographics went to a micropublisher, Information Handling Services. It should be noted that not nearly all of the government's purchases are made through GSA. Nonetheless, we do finally have a window on a part of the market.

Crystal Gazing into the Future

Allen KENT: University of Pittsburgh.

A study of the use of library materials suggests a rationale for placing greater emphasis on an "access" philosophy of providing library service, as opposed to a "local holdings" philosophy. There is a need to explore the cost-effectiveness of obtaining access to materials through networks. There are many configurations of such networks, offering a wide variety of services. Modeling and simulation are suggested as tools for computing economic break-even points for performing library functions in alternative network environments.

Crystal gazing entails an ability to forecast. It is very, very difficult to forecast—especially the future. It is also difficult to look into the past because so few records have been kept, especially of those things that people prefer to sweep under the rug—the failures. One of the failures has been of the library in forecasting what patrons will want to use. So I will start with a case study that will, hopefully, make this point clear.

Let me start with an observation that colleges and universities are not terribly successful in preparing their students for the future. This is simply because they do not know the future, and predict it only by extrapolating from trends. This approach is fraught with risks, and we are currently living with the consequences of this way of predicting the future. But perhaps higher education is faced with an unsolvable problem in attempting to find a better way to predict futures.

"The library problem" is a derivative of the intractable, or unsolvable, problems of higher education. Libraries buy mostly for future needs. But the judgments of librarians as to those future needs are no better than those of the presidents. Let us examine why librarians have such a difficult time in guessing what future requirements will be.

Their task is to select from the world's information store those materials that will be useful and *used*. These must be selected from great quantities of materials that are available. Thus:

- There have been 30 million unique titles published since Gutenberg: how many libraries have anything more than 5 percent of these? I guess some have less than ½ percent.
- There are 50–100 thousand journals published worldwide: how many libraries subscribe to more than 10–15 percent? Some subscribe to less than ½ percent.
- About 500 thousand books will be published worldwide in 1979: how many libraries will buy more than 10–15 percent? Some will buy less than ½ percent.

Given this situation, it is like finding a needle in a haystack to pick the "right" materials that will be *both useful and used.* Since the needle is not frequently found, presidents, chancellors, provosts, deans, and librarians sometimes are confronted by students and faculty who demand a better acquisitions budget to try to relieve their frustrations.

The question that arises is whether more money for materials alone can relieve these frustrations. It has been my hypothesis that the answer is "no", and that more money may lead to the acquisition of materials that are seldom if ever used.

And so an interest was awakened to develop measures for studying the extent to which library materials are used and the full cost of such use. It was my expectation that much of the material purchased for a research library is little or never used, and that the costs entailed are beyond ordinary expectations. My interest in such a study probably can be traced back to two episodes.

In 1939, I was fortunate in getting a job to help support myself in college—but I was unfortunate in getting a job as a shelf-reader in the City College of New York library. For those who have had such a job, I need not tell you how dull and dusty a job it is—so dusty in fact that one wonders whether use (or nonuse) of books can be measured by the thickness of dust on books.

Thirty years later, the Pitt director of libraries reported to me in the administrative hierarchy. In trying to understand the library system, I once presented myself to "original cataloging"—I told the staff member to imagine I was a book and asked for an explanation of how I got there and what would happen to me from there on out. The title had been requested 2½ years earlier (by a faculty member); it was received a year later and was "in process" 1½ years, being searched (and re-searched) every three to six months; and finally landed on the truck for actual cataloging. No one had requested it during 2½ years, and I wondered aloud if anyone would know, or care, if it were quietly dropped into the wastebasket. Then I began to wander through the stacks, wondering whether the collection *on the shelves* was used, and if so, how much. I pulled about 100 books off the shelves and found about half were never checked out. Few people were in the open stacks most times I dropped in, and I wondered how much in-house use there was. Since I was obliged to defend an expanding budget, I decided to acquire some real data about use.

(By the way, the two episodes I have described almost led to my demise—the shelf-reader episode from boredom; the administrator episode from a revolution by faculty and librarians when I pushed resource sharing as a means of coping with inflation in materials costs.)

A STUDY OF MATERIALS USE

So a study was designed to determine the extent to which library materials are used and the full cost of such use.* The study incorporates the machine-processible records of book and monograph usage through circulation (substantially complete starting October 1968) and through in-house reading (sampled

*"A Cost–Benefit Model of Some Critical Library Operations in Terms of Use of Materials," a study supported in part by a National Science Foundation, Division of Science Information, grant (Allen Kent and others, *The Pittsburgh Library Use Study* [New York: Marcel Dekker, Inc., 1979], in press).

during a two-term period). Also sampled was the usage of journals in science and engineering libraries.

Additions of books and monographs to the Hillman Library collections showed similar patterns of use over the years. For example, for 1969 acquisitions, 40 percent did not circulate externally in seven years. When a book does not circulate within the first six years of ownership, the likelihood of its ever being borrowed is less then one chance in fifty. The sampling of journal usage similarly confirmed that use is confined to a very small portion of the journal collection.

Two methods were followed in estimating the cost of book use: one treating acquisitions as a fixed cost, the other treating them as a variable cost. The results suggested that costs are beyond ordinary expectations—more than $50 per "new" book circulation on the most liberal accounting basis.

In-house use was also sampled: 74 percent of the titles used in-house had also circulated previously. Over time, the percentage of matches between external circulation and in-house use can be expected to increase. External circulation data over an extended time period can be utilized with a high level of confidence to measure total book use—in terms of items used, not frequency.

A methodology has been suggested for identifying "high risk" and "low risk" in book ordering by LC class, based on average cost of book use and its standard deviation.

From the standpoint of applicability to other libraries, the study suggests (1) a methodology for estimating library use; (2) a methodology for estimating the cost of book use; (3) a "risk analysis" approach to making acquisitions decisions; and (4) a framework for future estimation of cost-effectiveness and cost–benefit of library operations.

SOME FORECASTS

From this experience, I am ready to present my first set of forecasts for the future:

> Appropriate use of technology will enable the tracking of the consequences of purchasing library materials—*use*
> —which will lead to new standards for collections, replacing artificial standards (such as the Clapp-Jordan formula) which are based on numbers of students, faculty, program levels—which address only *how many*, rather than *which;* in other words, a substitution of quality standards as opposed to quantity standards
> —which will lead to more careful attention to *use* statistics
> —which will lead to attention to more sophisticated decision processes, based on *analysis of risk* in purchasing (acquisition librarians will need to add *statistics* to their bag of tools and tricks)
> —which will lead to an *access* philosophy rather than a *holdings* philosophy.

Returning to the case study I described, one of the principal results of this study shows that only 56–60 percent of the books and monographs added to the collection in any one year ever circulate. Similar results are being confirmed in a few other library environments. Further studies are needed to confirm whether in fact these results are widespread. Although the project reported here had essentially the total population of external patron circulations, sam-

pling methodologies have been studied and tested; these may also prove useful to other libraries.

If we assume that these results are confirmed, there are a number of important questions and implications. The first question is: Why? The answer or answers to this question are likely to influence librarianship and libraries in dramatic ways. If, for example, it can be shown that the card catalog does not allow reasonable access to the book collection, then new approaches to the concept of the card catalog will be needed. If, for example, it can be shown that more refined acquisition policies and procedures are needed, then more sophisticated collection development techniques must be developed and tested.

Further, the study shows that for books and monographs added to the collection during a one-year period, approximately 40 percent never circulate (in seven years), 14 percent circulate only once, 8 percent twice, 6 percent three times, and so on. These data indicate that should a library find it fiscally attractive to acquire only those items that will be used twice or more, then 54 percent would not be acquired.

It seems safe to say that there is a portion of the collection that reasonably should be shared among several libraries. The principal questions are how to identify those books and monographs before acquisition and how to identify the cost-effective equilibrium points where access rather than ownership makes sense.

The effectiveness of the card catalog as a tool for guiding potential users to the collection must be reexamined in the light of the 56–60 percent utilization rate of the book collection. With the closing of the card catalog in several libraries, including the Library of Congress, there is a major opportunity to review the purposes that it serves. In addition, machine-readable catalogs permit many new services not commonly associated with or possible with card catalogs. For example, the removal or labeling of the catalog cards for books moved to storage is a clumsy and costly process at best. Machine processes will obviously facilitate these changes.

RESOURCE SHARING

So I am prepared to present my second set of forecasts for the future, relating to resource-sharing library networks.

Resource sharing denotes a mode of library operation whereby all or part of the library functions are shared in common among several libraries. The basic functions may be classified as acquisitions, processing, storage, and delivery of service. There is no single system currently in operation in which all of these functions are shared, although networks which might become "full service" (ALL functions to be shared) are coalescing in connection with several developing national systems. The dominant aspects of resource sharing to date have been in the areas of processing and delivery of service. There have also been significant activities in the areas of centralized storage and acquisitions. In addition, several commercial organizations offer bibliographic access, via national computer time-sharing systems, to the journal and document literature of many disciplines.

The data in this use study I have discussed, if confirmed in other environments, can be extremely important in making purchase and/or resource-sharing decisions. In the purchase decision, the most critical area is not where a clear

buy/no-buy judgment can be made. Rather, in the gray area, where there is uncertainty, can data such as these be helpful, particularly when there is consideration of the subject-area/client data which may differentiate behavior and needs in different disciplines. It is evident that resource-sharing alternatives to local purchases must then be explored. One of the consequences of this exploration could be decisions to acquire fewer materials locally, and to depend, for access, on resource-sharing networks. But the typical resource-sharing network uses only a general policy statement regarding how to divide the burden of acquisitions among member libraries. The acquisitions person cannot apply this policy well when faced with a specific purchase decision in the gray area. This uncertainty can only be relieved by specific knowledge of what resource-sharing partners are buying and what they hold

—which will force networks to have union catalogs on-line, to permit *certain* knowledge of holdings of resource-sharing partners on an item-by-item basis, *both* when making acquisitions decisions *and* when accessing the collections of others

—which will force computerized circulation systems to come on-line, so that real time information can be transmitted as to whether an item held is indeed *in*, and if not, when it is due back

—which will feed back to the need to assess cost-effectiveness of *access* as opposed to holdings

—which will raise the question as to whether it is necessary for networks to be in full operation before such cost-effectiveness assessments can be made.

In order to deal with this last point, it is instructive to examine the topology and anatomy of networks.

NETWORK TOPOLOGIES

In theory, three network topologies may be distinguished: star, hierarchical, and distributed.*

The star network entails one network member holding substantially all resources, with all other members utilizing these resources. The configuration may be diagrammed as in figure 1.

The hierarchical network entails members sharing resources locally, passing unsatisfied needs along to the next greater resource center. The configuration is shown in figure 2.

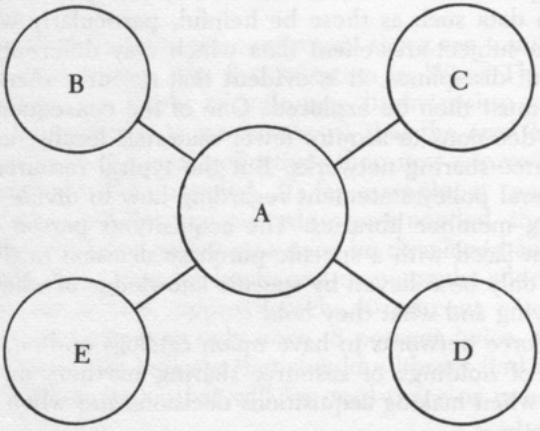
The distributed network (figure 3) is composed of members with equal, but different, resources, with all members able to call directly on the resources of all other members.

Resource-sharing networks currently in operation or in planning can be analyzed in terms of three factors:

1. Type of network.
2. Type of source material.
3. Operations (functions) performed.

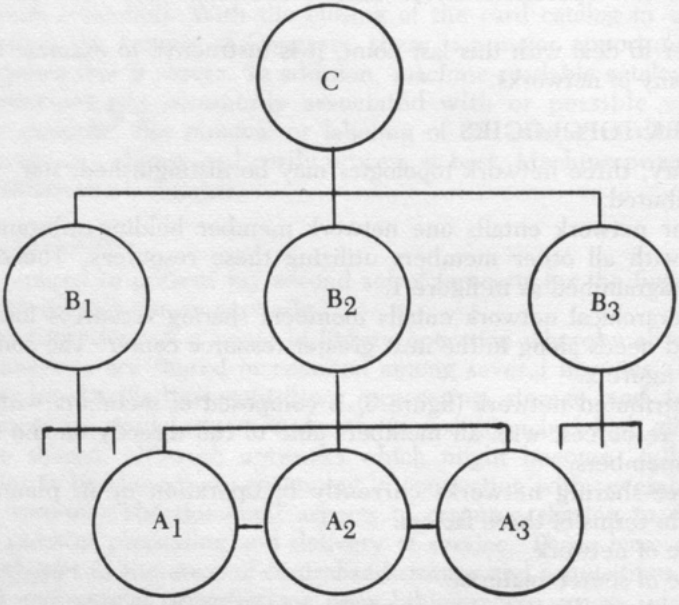
If these three factors are displayed in three dimensions (figure 4), it is possible to depict a taxonomy in terms of specific operations performed by specific net-

*Allen Kent and Thomas J. Galvin, *The Structure and Governance of Library Networks* (New York: Marcel Dekker, Inc., 1979), in press.



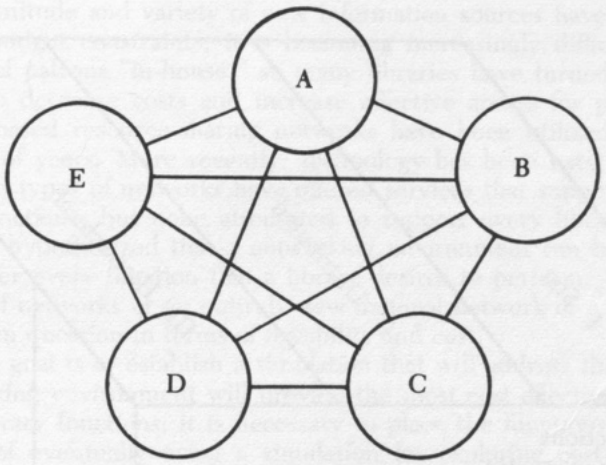
One network member (A) holds all resources, with all other members (B–E) utilizing these resources.

Fig. 1. Star Network Topology.



Network members (A_1, A_2, A_3) share resources, with most needs satisfied before requesting service from the next greater resource center (B_2); finally the few remaining unsatisfied requests are referred to the "library of last resort" (C), which may be obliged to check other centers (B_1, B_3) to locate required materials.

Fig. 2. Hierarchical Network Topology.



All network members (A–E) hold, in theory, different resources, which they share with one another.

Fig. 3. Distributed Network Topology.

work types for given types of source materials. Thus, a star network (I) which offers bibliographic access (3) to books and monographs (B) would be characterized symbolically as I.3.B. For example, the Research Libraries Group would be characterized as II.3.A., since it is working toward a distributed network (II) for three libraries (Yale, Columbia, New York Public–Science Technical Division), with initial emphasis on bibliographic access (3) and on serials (A). The concept of a national periodicals bank (III.7.A.) is being proposed as an hierarchical network (III) for serials (A), with primary emphasis on delivery (7). The experimental Western Pennsylvania Buhl Network (WEBNET) is developing as a distributed network for books and monographs, but with all types of operations represented (II.1–7.B.).

If one were to characterize the hundreds of resource-sharing or cooperative activities in the nation, it is anticipated that one would find a morass of types of networks, operations, and materials involved, most with no clear interrelationships apparent, and no clear way of integrating networks which undoubtedly will be needed for long-run cost-beneficial services.

LIBRARY AND NETWORK FUNCTIONS

The three network topologies (figures 1–3) can be "fleshed out" in terms of input functions (performed by libraries), output functions (performed by, or for, patrons), and internal administrative functions. Generically, these functions are analogous for all types of materials, but may differ in the specific ways in which they are carried out.

Each of the functions in the aforementioned categories of input, output, and administration may be broken down into books and monographs, serials, and nonprint media. Each categorized function and its breakdown must be considered in the context of a network as well as a local operating environment.

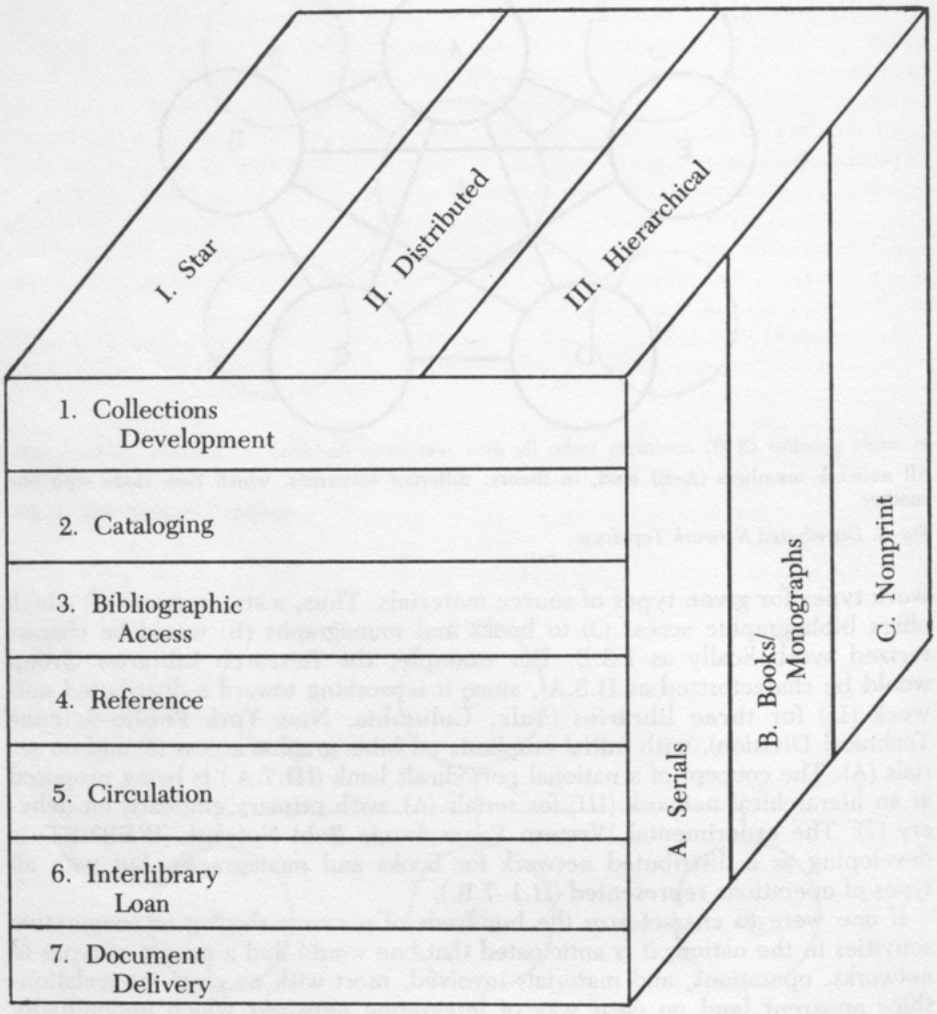


Fig. 4. Three-Dimensional Characterization of Networks in Terms of Operations (Functions) and Types of Materials.

Resource-sharing networks may perform all or part of one or more of these functions on behalf of member libraries. The extent, cost, and efficiency of network services are influenced by the technology available (e.g., computer, communications) and the extent to which "critical mass," in terms of number of transactions, has been achieved. Also influential in determining the acceptance of networks is the governance mechanism(s) employed.

Library administrators are facing difficult decisions concerning the most cost-effective means of satisfying the information requirements of their library pa-

trons. These requirements of patrons are increasing in variety and complexity, while the magnitude and variety of new information sources have increased as well. Given budget constraints, it is becoming increasingly difficult to satisfy the requests of patrons "in-house," so many libraries have turned to networks in attempts to decrease costs and increase effective access for patrons. Non-technological-based resource-sharing networks have been utilized by libraries for a number of years. More recently, technology has been used increasingly. Typically, both types of networks have offered services that supported one or a few library functions, but none attempted to support every library service or function. It is hypothesized that a networking environment can be established that would offer every function that a library desires to perform. Whether this is a network of networks or an entirely new national network or a regional network is an open question in terms of feasibility and cost.

An eventual goal is to establish a simulation that will address the question of which networking environment will provide the most cost-effective systems for performing library functions; it is necessary to place the functions in a context for purposes of eventually using a simulation for exploring cost-effectiveness questions.*

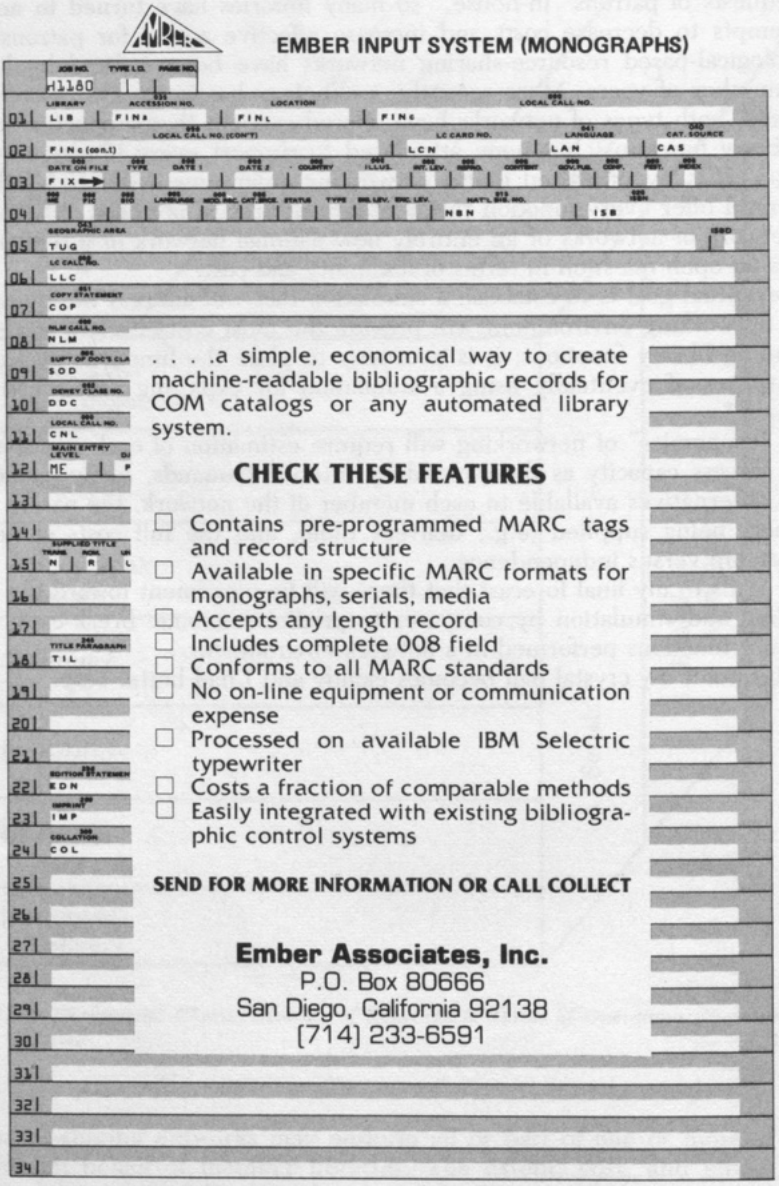
The "economics" of networking will require estimation of each member's capacity, excess capacity as determined by internal demands, likely outside demands, alternatives available to each member of the network, the nature of the "product" being supplied (e.g., delivery time), and the full costs of network membership versus independence.

This leads to my final forecast that there will be movement toward the use of modelling and simulation by computer to predict economic break-even points for library functions performed in a network environment.

At this point my crystal ball becomes cloudy and I had better stop.

*Allen Kent, principal investigator, "The Economics of Information Transfer Using Resource Sharing Networks—Network Functions" (grant DSI 77-17635, National Science Foundation, Program for Economics of Information, Division of Information Science and Technology).

Ember Associates Announces. . .



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Library Automation A Bibliography, 1973–77

Martha W. WEST and Alice QUIROS: San Jose State University, California, and Information Access Corporation, Los Altos, California; and George GLUSHENOK: San Francisco Public Library, California.

INTRODUCTION

This is the fifth consecutive bibliography on the subject of library automation to be published by ALA. The preceding bibliographies (in reverse chronological order) are:

West, Martha W. "Library Automation: Bibliography 1973," in *Library Automation: State of the Art II*. Chicago: American Library Assn., 1975.

Billingsley, Alice. "Bibliography of Library Automation," *American Libraries* 3:289–312 (March 1972).

Mason, Charlene. "Bibliography of Library Automation," *ALA Bulletin* 63:1117–34 (Sept. 1969).

McCune, Lois C., and Salmon, Stephen E. "Bibliography on Library Automation," *ALA Bulletin* 61:674–75 (June 1967).

While the general focus remains constant throughout these various publications, the choice of subject classifications does reflect the change of emphases within the library community and the computer world. This can be seen in the shift from a large number of citations to specific applications in single libraries to a growing number of references to networking in its widest sense.

Because of the length of time covered—mid-1973 to the end of 1977—and the growth of the literature itself, greater selectivity is shown in the references cited. An effort was made to exclude that literature which consisted of brief notices or of republication of material already cited. A large number of articles were examined but rejected for inclusion because of their ephemeral content. While the emphasis is still upon U.S. applications, the bibliography contains some few references to foreign studies, as well as a section on Canada and the Canadian National Library and Great Britain and the British Library.

Citations were retrieved from both manual and machine-readable data bases, notably *Library Literature*, *LISA*, ERIC, *Information Science Abstracts*, *Social Sciences Citation Index*, and MARC (courtesy of BALLOTS). A number of journals were searched cover to cover.

A preliminary draft of this bibliography was distributed at the LITA Library Automation: State-of-the-Art Preconference, Chicago, June 22–23, 1978.

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Technical Communications

Automated Circulation, Patron Satisfaction, and Collection Evaluation in Academic Libraries– A Circulation Analysis Formula

Over the past thirty years various formulas have been developed for assessing collection requirements and establishing standards for entire university collections.[1] Perhaps the best known formulas used at present are the Voigt formula and the Clapp-Jordan formula.

The Voigt formula establishes a rate of acquisitions for the collection based on weighted figures for the number of potential clients and degree levels offered,[2] while the Clapp-Jordan formula attempts to assess adequacy of a collection size without consideration of acquisition rates.[3] Neither of these formulas considers actual use made of the collection or the assessment of specific subject areas.

With the advent of sophisticated automated circulation systems the possibilities of delivering and correlating circulation use statistics to specific subject areas have been greatly augmented.[4] Several librarians and information scientists have used system-derived circulation information to weed collections, determine supply and demand, and order duplicate copies. For example, Trueswell employs the last circulation date as an indicator of user requirement to the problem of weeding a collection, but does not attempt to correlate these figures in relation to acquisition rates either in an entire collection or in any specific subject area.[5] No consideration is given to user categories.

Mostyn, on the other hand, discusses supply and demand, suggesting that periodic tallies be made of books in circulation by classification number.[6] He recommends that these figures be correlated to actual volumes on the shelves to determine supply and demand. Unfortunately, Mostyn concentrates his formula on public library use, which has a highly variable population, making such correlations difficult.

However, academic library use has been much less variable, allowing considerable documentation on the user characteristics. Proceeding with the assumption that it would be possible to somehow combine the known, measurable patterns of academic library use with the automated circulation printouts, we developed a budgetary formula that would make use of the available data. The flexibility of the Arizona State University Library Circulation system provided needed daily data—category of patron and LC class numbers. Using the Golden method as a model,[7] we were able to analyze the course offerings in a given department, assign LC class numbers to these courses, count the shelflist cards in those LC categories, and derive the actual collection holdings potentially supporting a given academic program. By correlating this information to the known number of faculty, graduate students, and undergraduates in a department, as well as the circulation statistics for the various LC classes by category of users, we have devised a formula to assess current utilization, as well as the average number of volumes required per category of user to maintain the present level of user satisfaction.

In utilizing the formula, it is necessary to ascertain the following by manual or machine counts:

Let: N_f = number of faculty in given department

N_g = number of graduate students in given department majoring in subject

N_u = number of undergraduate students in given department majoring in subject

B_f = average daily number of volumes in subject area checked out to *all* faculty

B_g = average daily number of volumes in subject area checked out to *all* graduates

B_u = average daily number of volumes in subject area checked out to *all* undergraduates

d = total holdings of circulated volumes in designated LC categories applicable to curriculum.

In order to determine the average number of books checked out by *each* faculty member, graduate student, and undergraduate student at any given period of time, the following ratios were employed:

$$\frac{B_f}{N_f}, \quad \frac{B_g}{N_g}, \quad \frac{B_u}{N_u}.$$

Total number of books checked out by category of user is divided by the number of users contained within that category in any given department. Based upon these three numbers, i.e.,

$$\frac{B_f}{N_f}, \quad \frac{B_g}{N_g}, \quad \frac{B_u}{N_u},$$

the number of books from the total number of volumes in the collection for the three user groups can most easily be expressed in one formula:

$$x_1 = \frac{d}{\frac{B_f}{N_f} + \frac{B_g}{N_g} + \frac{B_u}{N_u}}$$

In solving for x_1, we have obtained a factor that when multiplied by each of the ratios will divide the total number of circulating titles in the collection for each category of user, i.e., the number of volumes in the subject area the library needs for each user group at current utilization rates.

However, in order to determine the number of monographs that must be added to the collection upon addition of members in any of the three groups, it is necessary to divide x_1 in the same manner as was done previously. This second factor will be called x_2, and the expression can be stated:

$$x_2 = \frac{x_1}{\frac{B_f}{N_f} + \frac{B_g}{N_g} + \frac{B_u}{N_u}}.$$

Since

$$x_1 = \frac{d}{\frac{B_f}{N_f} + \frac{B_g}{N_g} + \frac{B_u}{N_u}},$$

x_2 can be expressed:

$$x_2 = \frac{d}{\left(\frac{B_f}{N_f} + \frac{B_g}{N_g} + \frac{B_u}{N_u}\right)^2}.$$

x_2 will then give you the factor that is needed in order to determine the number of books that can be added to the collection upon the addition of a faculty member, a graduate student, *or* an undergraduate student. The expression for each of these is given as follows:

$x_2 \dfrac{(B_f)}{(N_f)}$ = T_f (total number of volumes to be added for an additional faculty member)

$x_2 \dfrac{(B_g)}{(N_g)}$ = T_g (total number of volumes to be added for an additional graduate student)

$x_2 \dfrac{(B_u)}{(N_u)}$ = T_u (total number of volumes to be added for an additional undergraduate student)

Added volumes include new titles and multiple copies of heavily used monographs.

To give an example, using the ASU Microbiology Department:

$$x_2 = \frac{d}{\left(\frac{B_f}{N_f} + \frac{B_g}{N_g} + \frac{B_u}{N_u}\right)^2}$$

$$= \frac{2506}{\left(\frac{98}{10} + \frac{73}{27} + \frac{106}{269}\right)^2}$$

$$= \frac{2506}{(9.8 + 3.0 + .45)^2}$$

$$= \frac{2506}{(13.25)^2}$$

$$= \frac{2506}{175.56}$$

$$= 14.3$$

$N_f = 10$ $B_g = 73$
$N_g = 27$ $B_u = 106$
$N_u = 269$ $d = 2506$
$B_f = 98$

The data obtained from the above formula can be utilized in any number of ways, effectively correlating the number of volumes in any given field to current levels of user satisfaction. Some of these uses include measuring requirements for additional copies or titles based on increased faculty, graduate, and undergraduate enrollment, and identifying categories possibly in need of maintenance.

Increase in Faculty

For each additional faculty member the library should acquire additional monographs in the designated areas to maintain the same level of service. For example, consider the following situation.

1. The microbiology faculty had checked out an average of 9.8 books in a designated period of time.
2. The above users were satisfied with the monograph collection during this time span.
3. A new faculty member was hired in the department.

One would then calculate x_2 using the Bell-Power formula and multiply it by 9.8. This number will then give you the number of monographs that should be purchased to continue user satisfaction at the same level it was before the new faculty member was hired. Example:

$$T_f = x_2\left(\frac{B_f}{N_f}\right)$$

$$= 14.3\left(\frac{98}{10}\right)$$

$$= 140.14$$

= number of monographs to be purchased to continue present user satisfaction levels.

Increase in Enrollment

The following derivations can be used to calculate the need for additional volumes to offset increases in graduate and undergraduate students, respectively, in a department:

$$T_g = x_2\left(\frac{B_g}{N_g}\right)$$

$$T_u = x_2\left(\frac{B_u}{N_u}\right)$$

Increased Levels of Use

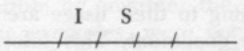
As the level of use increases with each category of user, x_2 will increase. For example, as B_f/N_f increases from 9.8 to 12.6, the number of copies and/or titles required to satisfy the user group would have to increase by x_2 (12.6). This figure can then be used to justify an increase in funds by the department in the library.

Identifying User Satisfaction

From the foregoing, it should become evident that user satisfaction is an important criterion in employing the formula. If user satisfaction cannot be quantified, then one could argue the credibility of the formula.

The Association of Research Libraries Office of University Library Management Studies has developed an importance/success survey which can be used to assess

user satisfaction.[8] The questionnaire consists of a listing of library materials. The user is asked to rate each one as to its importance in the library and the success the library has had in the acquiring of the material. For example:



In this case, the user felt that the importance of handbooks was 2 and the success of the library in obtaining the material was 3. By subtracting the importance number from the success number, a degree of success can be obtained; in this case a +1. Therefore, user satisfaction is near maximum. This information can then be used for any type of library material, including monographs. It is important to realize that the degree of success should be ≤ 0 for the Bell-Power formula to have any validity; that is, user satisfaction would have been achieved and the circulation figures would reflect that satisfaction.

If use of material begins to drop off in the yearly assessment, it may be that the collection is becoming dated and user satisfaction is decreasing. By administering the importance/success survey annually, the library can maintain guidelines for fluctuating levels of user satisfaction.

As with any other statistical tool, the Bell-Power formula should be a usable guideline for assessment of present and future user patterns, for determining collection and research support, and as a budget aid in analyzing enrollment growth statistics. The formula can be used with any retrievable user category and any retrievable LC class, depending upon the sophistication and flexibility of the circulation system.—*Colleen J. Power and George H. Bell, Arizona State University.*

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LC and BALLOTS Build a MARC Tag Data Base

Introduction

In an effort to encourage uniform usage of MARC (MAchine-Readable Cataloging) tags in the various bibliographic formats, the Library of Congress and the BALLOTS Center of Stanford University are jointly building an on-line data base describing the U.S. MARC data elements, i.e., content designators (tags, indicators, and subfield codes) used in the LC MARC records. The data base represents an expansion of the *BALLOTS Data Elements Dictionary* maintained by BALLOTS in machine-readable, text-editing form. The data base is being built under Stanford University's generalized data base management system, SPIRES, a system which not only provides the facilities to create a file definition, keeps track of the records, and builds the indexes, but also allows the data to be updated. This data base is accessible through many flexible indexes, which facilitates both general searches and those based on incomplete information.

Why the Data Base Was Created

The data base is the product of recent activities of both organizations. Discussions between the two indicated that both were interested in building such a data base and that a cooperative effort

could prove beneficial to the library community.

LC had been investigating methods for managing format specifications and for producing documentation. The data base will be a tool for maintaining the specifications for the U.S. MARC books, films, manuscripts, maps, music, and serials formats. From this unified collection of information, a variety of publications can be produced; LC is reviewing the choices that using the data base makes possible. Other uses, such as a data dictionary from which data structures for LC computer programs can be derived, are also under consideration.

At the same time, the BALLOTS Center had been developing the preliminary version of the data elements data base as preparation for its extensive system upgrade, a project known as the Network File System, which will support all MARC formats. The data elements data base will also contribute to the expansion of the kinds of information accessible on-line through the BALLOTS network.

Nature of the Problem

Using MARC tags can be quite complex. One problem is the number of tags defined by U.S. MARC: 158 unique tags are defined for the six bibliographic formats. Eight are defined different ways in different formats; thirty-seven are common to all formats. Table 1 indicates the distribution of the tags in the various formats.

Beyond the large number of tags that can occur in the six formats, the complexity of information about each tag also presents a problem. Specifically, tags identify fields, which may in turn contain subfield codes, identifying elements of a field, and indicators, giving additional information about the data in a field. Some subfields may be defined for some formats but not for others, or the definitions of the subfields may vary from format to format. In addition, the basic definitions of all the tags and the descriptive information pertaining to their usage are not available in one document. This information must be drawn from the individual format documents, their addenda, and the editing guides or data preparation manuals designed to assist users of specific formats. (Another document, the *Composite MARC Format*, summarizes many tag, subfield, and indicator names, values, and usages, but does not supplement information contained in the formats and their addenda.)

The complexity and fragmentation of these data, then, became an information management problem. Because a data base management system like SPIRES is designed to manipulate and organize complex data, it is a suitable approach to managing the U.S. MARC format specifications.

Using the data base allows data to be selected and organized to meet various user documentation needs. For example, all the U.S. MARC tag information can be published as one document, or the tag information related to just one record format can be published. In addition, the data in the records can be presented on-line or printed as output in a variety of ways (e.g., ordered by tag number or by tag name), depending on the purpose for which the data are to be used.

Contents of the Data Base

The data base is currently composed of information publicly available in various documents published by LC: basic data

Table 1. Tags in the U.S. MARC Formats as of June 1978

MARC Format	*Number of Tags Defined for Format*	*Number of Tags Unique to This Format*
Books	76	3
Films	72	12
Manuscripts	63	8
Maps	67	5
Music	76	9
Serials	108	45

from the *Composite MARC Format* and descriptive data from the specific format documents. The data base contains all the data elements used on MARC tapes today as well as those used on past tapes. Although the fields were originally designed to be as compatible as possible, the details, such as the examples, were not intended to be printed side by side. Thus, LC is editing the information for descriptions that are absent, conflicts in descriptions or examples, and descriptions that are nearly the same, yet not identical. In addition, LC will add information on indicator and fixed-field values, repeatability of data elements, and comments on the historical evolution of specific data elements.

Tag records in the data base currently contain tag number and name, indicator and subfield information, general and format-specific descriptions of the tag, and examples for specific formats. These records can be accessed by searching indexes based on tag name, subfield/indicator name, or MARC format. The tag name and subfield/indicator name indexes are word indexes, which allow a user to locate a tag when he or she works from incomplete information, or does not know the first word in a string.

LC will be solely responsible for editing and updating field specifications. The BALLOTS Center will manage the data base and will provide programming support for the editing process and for producing tape or camera-ready copy for LC publication systems.

The collaboration of LC and the BALLOTS Center to create a single, up-to-date file of MARC tag information will result in improved documentation of the bibliographic formats. The information contained in the data base will initially be made available to the library community through loose-leaf publications issued by LC and through on-line access available from the BALLOTS Center. Other methods of issuing this information are under consideration by LC in collaboration with the BALLOTS Center.—*Jointly submitted by BALLOTS and LC.*

Statement of Ownership and Management

Journal of Library Automation is published quarterly by the American Library Association, 50 E. Huron St., Chicago, IL 60611. Annual subscription price, $15. American Library Association, owner; William Mathews, editor. Second class postage paid at Fulton, Missouri. Printed in U.S.A. As a nonprofit organization authorized to mail at special rates (Section 132.121, Postal Manual), the purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes have not changed during the preceding twelve months.

Extent and Nature of Circulation

("Average" figures denote the number of copies printed each issue during the preceding twelve months; "Actual" figures denote number of copies of single issue published nearest to filing date—the June 1978 issue.) Total number of copies printed: Average, 5,578; Actual, 5,032. Paid circulation: not applicable (i.e., no sales through dealers, carriers, street vendors, and counter sales). Mail subscriptions: Average, 4,900; Actual, 4,313. Total paid circulation: Average, 4,900; Actual, 4,313. Free distribution by mail, carrier, or other means, samples, complimentary, and other free copies: Average, 312; Actual, 383. Total distribution: Average, 5,212; Actual, 4,696. Copies not distributed: Office use, left over, unaccounted, spoiled after printing: Average, 366; Actual, 336. Returns from news agents; not applicable. Total (sum previous three entries): Average, 5,578; Actual 5,032.

Statement of Ownership, Management and Circulation (PS form 3526, Mar. 1977) for 1978 filed with the United States Post Office Postmaster in Chicago, October 5, 1978.

News and Announcements

Library of Congress Name Authority Records Now in Machine-Readable Form

The Library of Congress has begun the distribution of Library of Congress Name Authority records for the current MARC Distribution Service year (April 1978 through March 1979). Subscribers receive an initial master file containing approximately 33,500 name authority records. Supplementary quarterly transaction files containing approximately 20,000 records each will be distributed during the first year of this service.

As the volume of name authorities input into machine-readable form increases, it is anticipated that distribution will be made more frequently. Subscribers will receive a copy of *Authorities: A MARC Format* and other technical specifications. This format has been designed so that all kinds of authorities can be defined within its structure.

The name authority records distributed on the noncumulative quarterly tapes will consist of new headings established during the quarter as well as any corrections made to machine-readable authority records during the quarter.

An updated master file will be made available once each year so that subscribers starting after the first year will need only to purchase the current master file and a current subscription to the quarterly noncumulative tapes.

Test tapes for name authorities are available for purchase. Records on the test tape have been selected to simulate the different records available through the service (that is, new records, deleted records, and partial correction records) so that users will be able to test their maintenance programs.

All tapes are available in seven-track, 556 cpi or nine-track, 800 cpi or 1600 cpi. Current prices for name authority services are: test tape $35; annual subscription, V.1 (the V.1 subscription includes initial master file and quarterly supplements) $3,300.

Orders should be submitted to the Customer Services Section, Cataloging Distribution Service, Library of Congress, Washington, DC 20541.

PRECIS RIN and RIN/SIN Fiche

Starting in autumn 1977 the British Library began making copies of its PRECIS indexing authority files regularly available on microfiche.

These fiche relate to all PRECIS index entries which have been created or checked within the Bibliographic Services Division since 1974. The entries covered include all those which have been used since 1974 for indexing the monographs entered in the British National Bibliography and now available on-line via BLAISE. In addition to this the authority files cover entries created for English and foreign language books indexed by the British Library Reference Division's Department of Printed Books, also to be available on BLAISE, and ones used in the British Education Index. Terms used by the British Universities Film Council to index films are also covered.

Complete issues of the files will be produced annually; bimonthly snowballing updates will be issued to cover entries added within each year. Two different types of service will be provided:

RIN Fiche—This file provides an authoritative listing of individual terms used in PRECIS index strings. For every term listed, its RIN (reference indicator number) is given. (This represents an address on a machine-held disk file, which is accessed to produce appropriate references in any PRECIS index which is produced.) The fiche also displays semantic relationships between the listed terms and their broader terms, related terms, and synonyms. Unused synonyms are also

listed with a note as to the preferred term.

This list of terms is not in the form of a hierarchically structured thesaurus, but provides an alphabetical list of terms together with auxiliary data. The file already contains more than 40,000 terms. Institutions creating PRECIS strings will be able to use the file as their main source of indexing terms. The fiche are produced at 42x reduction.

RIN/SIN Fiche—This file contains all the information provided on the RIN fiche, but also provides a considerable amount of additional material.

As well as listing individual terms used in index strings, the fiche also displays all the complete entries produced by the PRECIS strings. Formatted "see" and "see also" references arising from the index entries are also included.

Each complete index entry is followed by all the associated subject information. Therefore, by looking up a subject in the alphabetical list of PRECIS index entries, a user would find some or all of the following related material (the amount of additional material will depend on the publication for which the PRECIS entry was created): SINs (subject indicator number[S])—this number identifies the whole subject package; Dewey Decimal classification number; Universal Decimal classification number; Library of Congress classification number; Library of Congress subject headings; geographical area codes; PRECIS String; RINs.

This file will enable anyone who creates PRECIS strings to find complete, ready-made strings for an enormous variety of subjects. It will also help anyone searching the MARC files via BLAISE to search easily for extremely precise subjects; if a searcher finds a string that expresses exactly the subject he wishes to retrieve, he can note the SIN, a seven-digit number, and retrieve any record which has been indexed by that PRECIS string by entering the number alone. It also provides a useful guide to the Dewey classification for particular subjects.

This file is also produced on 42x reduction fiche with 208 frames per fiche. The file already contains more than 90,000 different SINs on more than 100 fiche. Prices for non-BLAISE subscribers are £70 (annual listing only) and £95 (annual listing with bimonthly snowballing updates). VAT should be added to these prices.

Please address orders for either of these services to: Mrs. A. Campbell, BLAISE, British Library Bibliographic Services Division, 7 Rathbone Street, London W1P 2AL, England; telephone: 01-636-1544.

Computer Interface Standards to Benefit from NBS-Industry Technical Program

Developing the technical foundation for future federal computer interface standards through close industry–government cooperation is the aim of a new program announced by the National Bureau of Standards (NBS).

NBS has invited the computer industry—individual companies as well as the industry's trade and professional associations—to sponsor research associates to work with the bureau's staff on computer interface technology. Under the NBS Research Associates Program, scientists and engineers are sponsored by industrial, professional, trade, and other organizations to work at the bureau for specified periods on projects of mutual interest.

The interface technology project will focus on computer systems and network architectures and interconnection techniques likely to be in widespread use in the next five to ten years. The industry/NBS team is expected to develop the technical basis for federal standards applicable to advancing computer technology.

Likely investigation areas include: formal and informal ways of describing interfaces and related higher-level protocols, including description languages; alternative means for implementing interfaces so that they can be changed readily; and newly developed interfaces such as those based on high-speed bit serial communication.

Companies and associations interested in participating in this joint effort are invited to write to Thomas N. Pyke, Jr., Chief, Computer Systems Engineering Division, A231 Technology Building, Na-

tional Bureau of Standards, Washington, DC 20234.

New BALLOTS Terminal—The ZMS-90

Stanford University's BALLOTS Center announces a new BALLOTS terminal—the ZMS-90—manufactured by the Zentec Corporation of Santa Clara, California. This terminal incorporates technological advances and supports several of BALLOTS' present development efforts:

- Synchronous communications, allowing larger number of terminals per line, faster data transmission rates, and greater reliability;
- Extended character set, permitting use of the complete MARC character set of diacritics and special characters;
- Nonroman character sets (BALLOTS is committed to support Cyrillic and Hebrew character sets by late 1979);
- Program-controlled loading of new capabilities by RAM (Read-Access Memory), eliminating the need for on-site hardware modification to support these capabilities; and
- Greater increased equipment and software enhancements, including improved remote diagnostics.

The first BALLOTS ZMS-90 terminals when installed in February 1979 will extend BALLOTS full-face shared cataloging service to the east coast. Currently all shared cataloging libraries in the Midwest or east coast use general-purpose terminals in line-by-line communications mode, also used by more than 100 libraries accessing BALLOTS for bibliographic searching service.

Anyone wishing further information should contact the BALLOTS Center.

American Geological Institute Awards Contract to Informatics for Networking Study

Informatics Inc. has been awarded a subcontract by the American Geological Institute (AGI) for the purpose of jointly undertaking a study funded by the National Science Foundation (NSF) entitled "Designing an Experimental Cooperative Network for Sharing Information and Data Resources in Geology."

Emphasis of the study will be placed not only on testing a number of technical networking concepts but also on the organizational and economic problems that are likely to be encountered by institutions which are undertaking a cooperative venture of this kind. Informatics Inc. Information Programs Division will be responsible for the technical elements of design and testing and will prepare the final evaluation report and technical recommendations.

The study will help the NSF learn if new information and communication developments, primarily used on a large-scale, national level, can be applied just as effectively for improving information and data exchange within small, specialized research communities—specifically state geological surveys.

Five states—North Dakota, Iowa, Utah, Minnesota, and Alabama—have volunteered to work with AGI and Informatics on this study. They will provide a representative working environment where Informatics and AGI can discover the economic and organizational barriers that might exist, and explore ways to apply networking technologies.

The results of this study will have many implications for the planning and development of networks for small, technologically oriented organizations. Short range, the study will demonstrate the effects of applying modern information and communication technology to meet a complex array of user needs.

Long range, if networking proves successful, the study could produce considerable incentive for broader commercial development of networking technology and information products and services. In addition, the project will most assuredly expand the "information consciousness" of state geologists and make them more aware of the information technologies that can make research sharing possible. Beyond that, national interests in the areas of energy resources and environmental impacts will be served when geological information systems are improved.

Jay Lavoie, vice-president and general manager of the Information Programs Division, has designated John Murdock as director of the study.

Informatics Inc., founded in 1962, is headquartered in Los Angeles and maintains offices in major U.S. cities, Canada, Europe, Japan, Hong Kong, and Brazil. The company markets software products, professional services, and information-processing services. Informatics is a subsidiary of the Equitable Life Assurance Society of the United States.

BALLOTS Announces New Tape Service

Stanford University BALLOTS Center announced a new tape service, a Catalog Data File Tape, to its shared-cataloging users at a user group meeting held August 11, 1978. The Catalog Data File tapes, scheduled to be produced in mid-November of this year, will reflect for a shared-cataloging library all of its cataloging records as they presently exist in the BALLOTS data base. Since BALLOTS cataloging records contain local holdings information and local modifications, the Catalog Data File Tape will capture a library's on-line catalog as it exists at the moment of tape production.

It is expected that libraries will use their Catalog Data File Tape to:

- create or update book or COM catalogs;
- create a circulation system machine-readable file; and
- obtain management statistics and collection development information.

The first Catalog Data File Tape was successfully produced this past July for Stanford University's Meyer Undergraduate Library to create a triannual COM catalog available for student use for the fall quarter. Supplements to the cumulative catalog are provided using the BALLOTS Monthly Tape Service, which captures all current cataloging transactions.

Upon completion of the Network File System, the BALLOTS Center expects to offer the Catalog Data File Tape service on a regularly scheduled basis to its shared-cataloging library participants.

Network Advisory Committee

Members of the Network Advisory Committee (NAC) presented a state-of-the-art report at a program on Sunday, June 25, from 10 a.m. to noon, sponsored by the Library and Information Technology Association (LITA) of ALA, the National Commission on Libraries and Information Science (NCLIS), and the Library of Congress. Maurice J. Freedman, president of LITA, presided, and Roderick G. Swartz, state librarian, Washington State Library, served as moderator.

Alphonse F. Trezza, executive director of NCLIS, in his introduction, gave the background information leading to the formation of the Network Advisory Committee. Trezza described the central role assigned to the Library of Congress in the NCLIS program document *Toward a National Program for Library and Information Services: Goals for Action* regarding nationwide bibliographic support. He then discussed the study ("The Role of the Library of Congress in the Evolving National Network"), now in press, conducted by Lawrence F. Buckland and William L. Basinski, Inforonics., Inc., under contract to the library's Network Development Office and funded by NCLIS, which recommended the establishment of a committee of network organizations to address the implications of networking on the organizations involved.

Ronald F. Miller, executive director, California Library Authority for Systems and Services (CLASS), summarized the planning paper *Toward a National Library and Information Service Network: The Library Bibliographic Component*. He reviewed the various sections of the paper, described the composition of the Network Advisory Committee, both participating members and the observers, and noted that although initially the various individuals appeared to be protecting their domains, these self-interests were now submerged in working toward common purposes.

Henriette D. Avram reviewed the accomplishments made by the Network Advisory Committee and its several subcommittees since the June edition of the planning paper. Avram discussed the work of the Network Technical Architecture Group and its document describing the general requirements for a message delivery system. This paper, approved by the Net-

work Advisory Committee, is being used for the preparation of a proposal to fund the detailed requirements for the message delivery system. Avram also discussed the work of the Network Advisory Committee governance subcommittee and its current activities; the Network Development Office glossary, which will be published for distribution late this summer; and the data base configuration project now under way, with Edwin Buchinski, National Library of Canada, spending two-thirds of his time with the Library of Congress on this effort. She noted that a Bibliographic Advisory Committee, chaired by Joseph Howard, Library of Congress, had been selected for this project and had met for the first time during the ALA Annual Conference (see the LC *Information Bulletin* for July 28, p.442).

Edward E. Shaw, vice-president and provost of Stanford University and director of the Stanford BALLOTS System, in addressing key issues, spoke of the role and responsibilities of the Library of Congress. He discussed the Network Advisory Committee's concern for technical, economic, governance, and programmatic issues, describing the technical aspects of networking as being the easiest to deal with but noting the importance to the technical design and delivery of coming to grips with the management and financial issues. Shaw also described the composition of the NAC Steering Committee and stated the Steering Committee responsibilities, including reviewing subcommittee efforts before submission to NAC, determining issues for NAC review, and setting the agendas for NAC meetings.

Warren J. Haas, president of the Council on Library Resources, told the audience of council efforts to seek funds from other foundations to work toward the development of a nationwide library network. Haas reported that the responses from foundations had been encouraging, that more than $2 million had been committed to date, and that an interim management committee consisting of representatives from NCLIS, CLR, and the Library of Congress would be formed to set the plan in motion. He noted that groups such as the Network Advisory Committee would be called on to assist in this effort.

Questions from the floor principally dealt with *AACR 2* as the issue of major concern to the community at this time.—*Henriette D. Avram, LC* Information Bulletin *37, no. 31.*

CLR Publishes Plan for National Periodicals Center

Libraries and individuals who use them may someday have access to a centralized collection of periodical literature if a plan for a National Periodicals Center, just published by the Council on Library Resources, Inc. (CLR), is put into effect. The 272-page document, *A National Periodicals Center Technical Development Plan*, sets forth the goals, objectives, structure, technical requirements, pricing schedule, and stages of development of such a facility.

In 1977 the National Commission on Libraries and Information Science proposed a periodicals center for the U.S. in its *Effective Access to Periodical Literature: A National Program* (Washington, D.C., 1977). That document recommended that the Library of Congress assume responsibility for developing, managing, and operating the center. LC asked the council to put together a technical development plan that could be used by the Library of Congress or any other agency prepared to establish a major periodicals facility. Several foundations contributed to the cost of preparing the plan, which was completed in August 1978 by a CLR project team headed by C. Lee Jones, health sciences librarian at Columbia University.

In his foreword, CLR president Warren J. Haas says the plan "is not a formal pronouncement by the Council . . . but is rather a document for consideration, to be refined if necessary and used without delay to help turn the aspirations long held by librarians and users of libraries into accomplishment."

The document discusses possible new relationships between publishers and a national periodicals center and takes into account requirements of the 1976 copyright law. Implementation and a possible governance structure are also explored.

Copies of *A National Periodicals Center*

Technical Development Plan are available upon request from the Library of Congress, Information Office, Washington, DC 20540.

The Council on Library Resources is a private operating foundation. Through grants to and contracts with other organizations and individuals, CLR seeks to assist in finding solutions to the problems of libraries, particularly academic and research libraries. The council was established in 1956 by the Ford Foundation and continues to receive support from it as well as other foundations.

BBC News

The BBC is the most powerful news-gathering service in the world. With more of its own correspondents than any newspaper or any other broadcasting organization it has a unique coverage of world events.

The BBC also subscribes to all the major news agencies and can draw on the resources of its other services including the World Service and its Monitoring Service, which monitors the transmissions of hundreds of foreign broadcasting stations. The sources of news stories are not normally given on the air but are included in the newsreaders' typescripts reproduced on microfiche. Either the name of the correspondent or the agency from which the story came is given. Compared with any newspaper, the presentation of the day's events in the 6 p.m. "Radio News" shows clearly the concise and highly disciplined style of the BBC developed over many years, reporting news accurately and in detail without bias.

It is as the world's leading news service that the BBC has gained its reputation over the years. "BBC Radio News" could be called "the people's news": its influence comes as much from its widespread popularity as from its reputation for unbiased accuracy.

The Index—A printed name and subject index to the 6 p.m. "Radio News" is published at the same time as the news on microfiche—within six weeks of the end of each quarter.

Names and subjects are combined in one alphabetical sequence and the indexing system is based on that used by the BBC for its own internal indexes, developed over many years.

The quarterly paperbound issues are stitched and punched for storage in a ring binder or for eventual binding, but may also be bought annually in a cloth library binding.

Specification—The "BBC Radio 6 p.m. News" on microfiche is offered as an annual subscription, the subscription price including the news on microfiche, four quarterly printed indexes, and postage and packing.

The microfiche and the printed index are dispatched to subscribers within six weeks of the end of each quarter.

The microfiche and index are sent to overseas subscribers by airmail at no extra charge.

The microfiche are 98-frame silver positive archivally permanent 105mm x 148mm microfiche designed to be read at a magnification of 24x. Each microfiche normally contains bulletins for two days. The date of each bulletin is shown clearly on the title strip of the microfiche and on an eye-visible caption at the beginning of each bulletin.

Prices: BBC Radio 6 p.m. News on Microfiche, annual subscription from 1 January 1978, News, approximately 190 microfiche issued quarterly, £195, $410; News and Quarterly Indexes, annual subscription including microfiche and four quarterly printed indexes, £225, $475; News, Quarterly Indexes, and Annual Index, annual subscription including microfiche, four quarterly printed indexes and the annual index (four quarterly indexes in a library cloth binding), £245, $515; Index to BBC Radio 6 p.m. News, annual subscription from 1 January 1978, four paperbound issues, totaling approximately 250 pages, published quarterly, £85, $180; Annual Index (four quarterly indexes in a library cloth binding), £85, $180.

All these prices include post and packing (airmail to overseas subscribers).

Other BBC Services published on microfiche: British Broadcasting Corporation, The Home Service Nine O'Clock News 1939–1945 60,000 pages on 765 mi-

crofiche, £765, $1450; British Broadcasting Corporation, Radio: Author and title catalogs of transmitted drama, poetry, and features 1923–1975, 52,000 cards reproduced on 125 microfiche £130, $260; Television: author and title catalogs of transmitted drama and features 1936–1975 with chronological list of transmitted plays, 18,000 cards reproduced on 44 microfiche, 840 pages reproduced on 19 microfiche, 63 microfiche £68, $135.

Updating Techniques for Microfiche Files Described in New U.S. Datacorp Brochure

U.S. Datacorp's exclusive Fiche Management System (FMS) for data base management of microfiche is described in a new eight-page brochure from Datacorp, the largest service company in computer output microfilm. FMS employs a system consisting of an original fiche file, plus updated fiche produced as needed and a master index that is created each time any addition or change is made in the file. By eliminating the need to reprocess the full file when changes are made, FMS substantially reduces costs. The system also makes data reference easier, reduces costs, supplies an audit trail of all transactions and permits multiple indices to be generated that can be keyed to file data in any way.

For a free copy, write U.S. Datacorp, P.O. Box 3460, Portland, OR 97208, or telephone collect (503) 225-5100.

Journal Holdings List

Boyd Childress, periodicals librarian, has announced the release of the *Journal Holdings List* for Western Kentucky University Library. The list is produced on computer output microfiche (COM) and will bring together the holdings of the Helm-Cravens Library, the Science Library, the Kentucky Library, and the Educational Resources Center. Included will be entries for the microform editions of periodicals in series such as the Library of American Civilization.

There are more than 6,000 entries, indicating title, notes, holdings (with format indicated for microforms), and location. This will greatly benefit the user, as there are a dozen locations for Western's periodicals. Cross-references are used as necessary.

Richard A. Jones, staff assistant to the director for library systems, who designed the project, stated that "The remarkable aspect of the list is that it is contained on one microfiche, even though there are more than 6,000 entries." The COM is produced on 72× reduction ratio to match the magnification of the library's complete COM author-title and subject catalogs, and will be placed with the fifty-two COM catalog reader stations throughout the library system. There will also be five additional readers on the main periodicals floor of the library. Updates can be made monthly, quarterly, or semiannually, according to the necessity.

In the future, the COM *Journal Holdings List* will be developed into an automated serials management system, which will include acquisitions, check-in, claiming, and binding.

1977 NBS Publications Catalog Now Available

Nearly 1,900 scientific and technical papers were published last year by the Commerce Department's National Bureau of Standards (NBS) on subjects ranging from A (abnormal loading of structures) to Z (zero-shift in pressure measurement).

The entire research output, totaling 46,021 printed pages, is described and referenced in the latest (1977) *Publications of the National Bureau of Standards* catalog. The catalog, edited by Betty L. Burris, lists research papers, applied mathematics series, interagency reports, national standard reference data series, building science series, monographs, handbooks, special publications, federal information processing standards publications, consumer information series, voluntary product standards, technical notes, patent citations of NBS inventors, and grantee-contract reports of NBS contractors.

Sixty-four percent of the 46,021-page total was published in the bureau's own publication series, and the remaining 36 percent in non-NBS journals, books, and proceedings.

The catalog tells how each paper can be obtained. Each is cited by title, author(s), place of publication, abstract, and key words. Citations for papers published in the bureau's formal program are organized by NBS publications series; NBS papers in non-NBS media are listed separately by number. A special section categorizes all 1977 papers by major primary subject area.

Also included is information on previous NBS catalogs and the availability of NBS papers published in past years. Papers published before 1977 but not listed earlier are included in the 1977 catalog.

Copies of the catalog (NBS Special Publication 305, Supplement 9) can be obtained by writing the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Orders must include the catalog's Stock Number 003-01951-8. Add 25 percent to the total cost of $7.50 if mailing outside the U.S.

New Monthly Is Guide to Computer and Communications Publications

Computer Business, a newsletter supplying categorized reviews of more than 125 key articles from dozens of computer and communications trade publications each month, is now available from Contemporary Communications, Inc.

"The newsletter can save executives, professionals, and librarians in these fields many hours each month staying up to date with their special areas of interest," said Mike Townsend, president.

"It serves especially well as a guide to what's recently appeared in publications the reader doesn't receive or get around to reading," he added. "Publishers of these trade publications also benefit from having their key material widely publicized."

Each review contains the title of the article, a brief abstract, the source of the article, and a unique "Reader's Key" denoting its length, orientation, and readability. Special editorial and production techniques ensure the timeliness of the content.

Annual subscriptions are $48 in North America, $60 elsewhere; the publisher will bill after the subscription begins. A three-month trial subscription is $12 (prepaid only). Mastercharge or Visa charges are accepted. For further information or a free sample copy, contact Contemporary Communications, Inc., 2909 Oregon Ct., Suite C-11, Torrance, CA 90503; (213) 320-6599.

Toward a Law Network: Survey and Evaluation *Is Available*

This report, prepared by Brett Butler, of Information Access Corporation, for the American Association of Law Libraries and the Association of American Law Schools, is now available. It may be ordered, at $7.50 a copy, from Information Access Corporation, 885 N. San Antonio Rd., Los Altos, CA 94022.

The report recommends that the American Association of Law Libraries assume sponsorship for the development of a law library network.

Two ALA/RASD Publications Available

The Reference and Adult Services Division of ALA has recently released two publications concerned with computer use in libraries. One of them, *Commercial COM Catalogs; How to Choose—When to Buy*, includes a buyer's outline of commercial COM catalog issues, a survey of current commercial COM catalog users, and a bibliography. It is $2.50 a copy and payment must accompany orders.

The other publication is *Charging for Computer-Based Reference Services*, edited by Peter G. Watson, the proceedings of a program organized by the Machine-Assisted Reference Section (MARS) of RASD and held on June 19, 1977. It is an examination of the broad philosophical and service questions raised by fee-based systems. It is $4 a copy and payment must accompany orders.

Order from the Reference and Adult Services Division, American Library Association, 50 E. Huron St., Chicago, IL 60611. Make checks payable to the American Library Association.

Book Reviews

Introduction to Minicomputers in Federal Libraries, by Micki Jo Young, with Frank A. Pezzanite and J. Chris Reisinger. Washington, D.C.: Federal Library Committee, 1978. 155p. LC: 78-1652.

This book, intended for library administrators and middle-level managers, offers introductory material on computers and library automation. Chapter one introduces computers, how they are organized and how they are programmed, in a manner much like many elementary textbooks on computers. Chapter two reviews the history and current status of library automation, networking, and minicomputer development. The third chapter repeats much of the information in chapter one while providing a general look at minicomputer architecture, peripheral information storage devices, and manufacturer-supplied programming aids. Chapter four introduces systems analysis and the functional characteristics of different library applications: e.g., acquisitions, cataloging, circulation, and serials.

For those already familiar with library automation, it is recommended by the authors that they skip the first four chapters and commence with the remaining two. Chapter five lists factors to be considered in selecting a computer system and provides detailed comparative information on different minicomputers. The final chapter outlines the roles of various organizations involved in the procurement process and offers a brief prediction of future trends. Two appendixes complete the work. One is a glossary of terms and the other is a request for proposals released by the Library of Congress.

Most of the material on computers is general and hence applicable to all computers—mini or otherwise. The detailed information on minicomputers which does appear in chapter five is outdated, as the authors predicted it would be at the time of publication. Many statements are made and common problems enumerated, but the lack of examples and practical suggestions leaves the approach somewhat superficial. The library administrator's need for sound practical advice on the unique strengths and pitfalls of minicomputer systems has not been satisfied. What has been presented is a respectable overview of library automation.

Douglas F. Kunkel
Washington Library Network
Computer Services

The Electronic Library: Bibliographic Data Bases, 1978–79, by Roger Christian. White Plains, N.Y.: Knowledge Industry Publications, 1978. 105p. $24.50. LC: 78-18408. ISBN: 0-914236-15-6.

This volume is an update of the first edition, which appeared in 1975. The format is much the same. The 1975 edition contained 118 pages, of which 79 were text, the remainder mainly appendixes. The new edition has 96 pages of text, with an added short bibliography and an index. The book is paperbound, and the price seems rather high.

It is surprising, considering the growth in use of on-line bibliographic data bases in the past three years, to note that the second edition repeats word for word many parts of the first edition. New information, however, is skillfully interwoven where needed. An introductory summary outlines the major areas of change. Of much interest is the drop in the direct cost of a search from an average of about $50 to approximately $25.

The background and development of machine-readable bibliographic data bases is clearly delineated and the promoting forces are defined. A chapter on data base producers describes a representative group

and the confused structure of the industry. Much new information is included in the chapter on data base distributors, with an update on important developments in telecommunications and descriptions of major distributors, changing fee structures, and successes and failures in competitive ventures. The chapter on data base users explains differences in reactions of types of libraries and the resulting effects on staff, training, and fees. Expanding usage in Canada and Europe is described.

Controversial issues which often generate emotional outbursts (library charges for service, government competition with private industry) are treated objectively and factually. The final chapter on problems, progress, and prospects shows that problems have not decreased, but have changed.

This book is a compilation of information that would be useful for any beginner in the on-line bibliographic field. It also presents an excellent overview valuable to the practitioner or administrator.

Carolyn Brown
National Oceanic and
Atmospheric Administration
Rockville, Maryland

BOOKS RECEIVED

Computer-Output Microfilm: Its Library Applications, by William Saffady. Chicago: American Library Assn., 1978. 198p. $10.50. LC: 78-18416. ISBN: 0-8389-3217-7.

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Michael Gorman and
Paul W. Winkler,
editors

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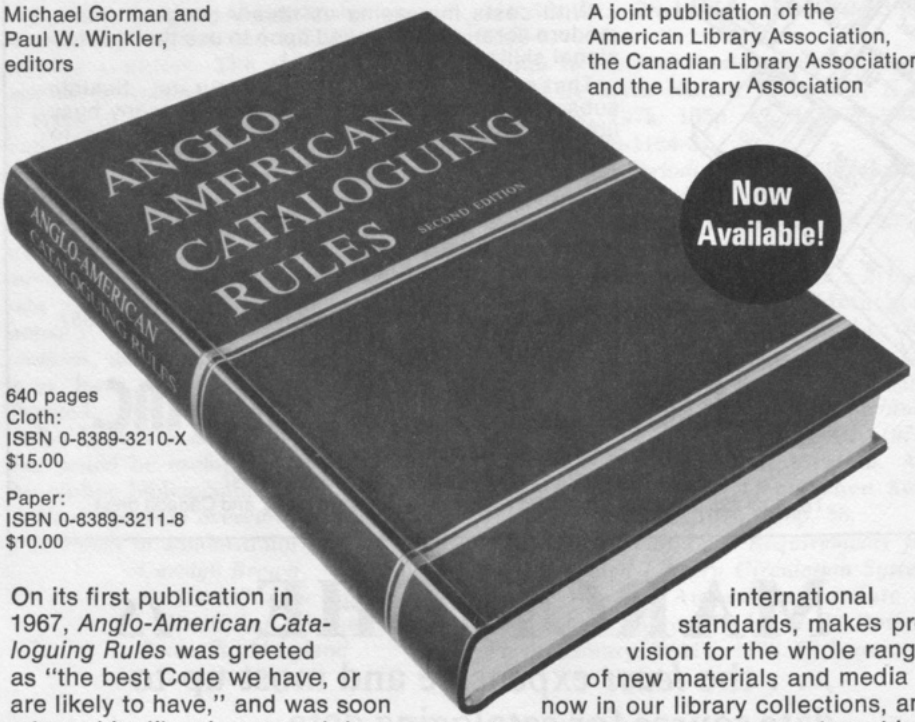

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