



Bibliographic Systems, 1945-1976

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IT IS BEYOND my talent to compress three decades of activity—especially in a period of intense and radical change in bibliographic control—in a scholarly, definitive manner. Many of the points to be covered could well be the subject of a dissertation. Therefore, the eyewitness account technique will be relied upon whenever possible.

This paper is divided into two main parts. The second part describes the major changes made in bibliographic control systems over the past three decades, while the first discusses why these changes have occurred. The viewpoint expressed here is that, left to itself, bibliographic control would not have changed. The changes that occurred are largely attributable to causes and events outside the library field.

OUTSIDE INFLUENCES

Perhaps in no other equally brief period have libraries been subject to such a diversity of outside influences, absorbed and adapted them so readily and creatively, and so altered the course of bibliographic control. Among these many influences, four broad areas are of major importance: (1) the changing philosophy of information, (2) the data processing and computer industry, (3) scientific management developments, and (4) increasing recognition of the inequities of resource distribution to disadvantaged citizens.

INFORMATION AS A NATURAL RESOURCE

The conduct of World War II demonstrated very clearly the importance of the technical superiority of the United States. Resources were marshalled as never before to provide information

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services to both private and public organizations working on military, intelligence, and defense projects. The need to provide technical information and logistic control for large-scale projects with rigid schedules was met by use of operations research techniques and the newly emerging computer technology.

Some librarians and many people who were later to be called information scientists were thus graphically exposed to the increasing value placed on information, and particularly on scientific, technical, and intelligence information. Information came to be described as a "national resource" and librarians were by implication perceived as contributing to, or detracting from, this resource. Abstracting and indexing services were viewed as playing the major role in access to this resource, whereas the library's role was often described as that of a historical repository for materials no longer of current interest. Librarians were frequently charged with having abdicated their responsibilities for bibliographic control of journal articles and technical reports. In the 1950s it was not uncommon to hear that if librarians did not adjust and do their job, others would take over their tasks.

From this milieu came mathematicians, physicists, engineers, and other specialists—a type of person whom the librarian would not normally have encountered in professional groups before World War II. The enormous influence of these people on national bibliographic programs, on special and academic libraries, on library education, and on individual librarians has yet to be documented thoroughly, but was nevertheless a crucial factor. The list of participants at the International Conference on Scientific Information held in Washington, D.C., in 1958 is perhaps typical. Attendees included Harold Borko, Lawrence F. Buckland, Cyril W. Cleverdon, Melvin S. Day, Maryann Duggan (then a petroleum engineer), R.A. Fairthorne, Eugene E. Garfield, Robert M. Hayes, Gilbert King, William T. Knox, Ben-Ami Lipetz, Hans Peter Luhn, Claire K. Schultze, Don R. Swanson, and B.C. Vickery.¹

This sudden infiltration of the domain of librarianship by those outside the field created communication difficulties, misunderstanding and, in some cases, an oversimplification of the problems of bibliographic control. Nevertheless, these outsiders, who derived their concepts of information handling and control from the scientific community, military information activities, and computer developments during or immediately after World War II, forced the library

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field to re-evaluate its services, to examine its traditions, and to devise new methods of information handling and bibliographic control.

THE DATA PROCESSING AND COMPUTER INDUSTRY

The equipment available to do bibliographic tasks often has a limiting and repressive influence, largely unacknowledged or unnoticed, on our perceptions of bibliographic control. This influence subtly forces us to believe that only certain things should be done, and that they can be done only in certain ways. An instance of the former belief is that because the manual card catalog makes complex searches difficult and preparation of bibliographies for users time-consuming and expensive, these services are considered inappropriate in most libraries. An instance of the second is the difficulty of explaining why the subject-heading cards from OCLC will not be printed in red and that it makes no real difference. Attention is diverted from substance to mechanics.

The mechanics available to bibliographic control were reviewed by M.E. Scott, just prior to the time period under consideration here.² In 1941 the methods included: photographic copying (resulting in cards that were like photostats), stencil and hectographic processes, offset lithography, printing (rarely used except by the Library of Congress), and the typewriter. Although the electric typewriter was proving increasingly reliable, Scott failed to discover any library using this new device.

The punched card was only beginning to be used. For example, just prior to World War II, the Montclair (New Jersey) Public Library had been selected by IBM for a test installation of a punched card circulation system.³ The University of Florida and the University of Texas were also early users of punched cards for circulation, and the punched card was being explored as a vehicle for bibliographic control in a few special libraries as well.

After the war, technical developments had impact on two areas of bibliographic control: (1) the production of catalog cards and other bibliographic products, and (2) the format and storage of the bibliographic record and files. In the first area, developments such as punched cards, mimeograph, multilith, photocopy machines, microfilm-based card-image systems, and tape-controlled typewriters and keyboards were relevant. In the second, the storage of the bibliographic file in machine form allowed use of photocomposition, com-

puter output microform, cathode ray tube terminals, and line printers, as well as telecommunications of bibliographic data.

Some of the developments and experiments did not succeed. In the immediate postwar era, librarians were encouraged to store and retrieve bibliographic records from data bases in a variety of forms, including punched cards to be manipulated by card sorters, keysort cards, edge-notched cards, and microfilm retrieval devices. Although these techniques were used in some special libraries and information centers, they were largely ignored by the library field. The reasons for this are not entirely clear. One would like to think it was because librarians recognized the limits imposed, over the long run, by these techniques, but one suspects that it was due to the general apathy toward new technology; whatever the reason, the response was correct.

In general, the limitations of these technologies stemmed from the fact that they, like the card catalog, allowed no significant manipulation of bibliographic data. The computer was the first device to offer a real solution—manipulative capabilities, speed of retrieval and handling, and compactness of files. In the postwar era the infant computer industry rapidly began to make inroads in business, industry, government, and scientific fields. There was a bad period of oversell—the computer was described as a “brain,” people would be replaced by these machines, and almost all problems would be solvable (for example, automatic translation of languages was said to be “just around the corner”). The difficulties inherent in automation of bibliographic control systems were grossly oversimplified.

Although there were a number of experiments with computers, librarians were seen as lagging behind and the dichotomy between librarians and information scientists continued. In the late 1950s and in the 1960s many universities set up different professional schools for the two disciplines. The work of individual librarians who served during this period to bridge the gap between the computer field and the library field was important in bringing to the attention of the community the problems of the automation of bibliographic control, in pointing out the benefits that could accrue from automation, and in beginning to solve the many difficulties to be faced.

A major influence during these three decades was therefore the advance of technology. Developments were so rapid that a period which began with the electric typewriter ended with on-line computer-based networks.

SCIENTIFIC MANAGEMENT AND SYSTEMS ANALYSIS

Although scientific management techniques had been around for some time, it was largely the trend toward automation that brought scientific management and systems analysis to the attention of library management. The attempt to automate library operations revealed our ignorance. We had little statistical data of real value to systems designers; we had ignored the interrelationships between library operations; we had an imprecise terminology with which to talk about library and bibliographic control systems; and we lacked even general cost data. For example, although the Library of Congress had been producing the printed catalog card since 1901, it was the work on the development of the MARC (Machine Readable Cataloging) format which stimulated analysis of these cards, field by field and character by character.

Bibliographic control of monographs and serials over the past thirty years has been rule-centered instead of cost- and use-centered, as evidenced by citations in *Library Literature*. The number of articles dealing with rules and their interpretation is overwhelming in comparison to those on use, benefits, management and cost of bibliographic control. In the late 1930s, a head cataloger was one who personally sorted and distributed incoming materials and served as a referee in cataloging decisions and application of rules. Rarely were other management and analysis tasks described as part of the job. By the 1970s, while there were still many articles concerned with codes and rules, a bibliographic control literature has emerged which reflects concern for utilization of staff, unit cost of production, reorganization of work flow, and reorganization of traditional bibliographic relationships (e.g., between acquisitions and cataloging). Cataloging was seen less frequently as an arcane art, but rather as one which should be accomplished effectively using a mixture of skills and support services, including on-line networks and machine-readable data. We began this era with catalogers who were partly clerks and are ending it with clerks who are partly catalogers.

Today, public accountability for management of public institutions is of increasing concern. Although little overt attention seems to be given to this concept in the library field, it seems clear that there is a significant change taking place in our concepts of bibliographic control. In the palmier days of the past, there was great diversity in bibliographic control practices and inventing one's own system was common and acceptable. Today, the forces toward standardization

appear inexorable and as networks flourish, each local catalog is increasingly viewed as a subset of a national bibliographic control system and perhaps of a potential international system.

The systems view also attacked the notion of permanent rules for bibliographic control. The rapidity of promulgation of rules in the postwar era, and changes to the rules, give evidence of a new view that bibliographic control mechanisms must change as needs and technology change.

In contrast, the bibliographic control of journal articles and report literature, which was largely the province of professional associations prior to World War II, does not appear to have followed the same course as library bibliographic control systems. There has been no significant standardization of abstracting and indexing control systems, and they have proliferated. The analytical techniques have been applied to system design and performance within a single service, but not to the field as a whole.

Prior to the war, most of these services were meagerly funded and the major product was the published abstracting and indexing service. The need to be efficient or to standardize was of less concern when the government began putting enormous amounts of money into these bibliographic services after World War II. For example, Chemical Abstracts Service alone received more than \$25 million from the National Science Foundation over a seven-year period for the automation of *Chemical Abstracts*.⁴ These services were increasingly subsidized but, like libraries, began to suffer as costs soared, support dwindled, and competition mounted.

RESOURCE DISTRIBUTION

As prosperity continued in the postwar era, attention was given, generally at the urging of increasingly vociferous interest groups, to the inequities in our society. Resources and benefits were not equitably distributed and certain groups began to be identified as disadvantaged.

These social issues influenced funding agencies and the types of projects mounted, causing concern as the various professions examined their policies and programs to determine the blame for these conditions. The social issues themselves are largely outside the focus of this paper, but their influence on bibliographic control was threefold: (1) increasing attention to user services, (2) increasing competition for library funding, and (3) increasing interest in resource sharing.

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The dominance of the technical processing aspect of librarianship in the time period under discussion was probably due to its cohesive foundation of commonality of rules and processes, and the focus given to bibliographic control by Library of Congress activities. In contrast, aspects dealing with public service were less well organized, appear to have been less aggressive, and had a generally inferior professional literature. Libraries were accused of being more concerned with the condition of their catalogs than with service to their public. It became increasingly evident as inflation mounted in the late 1960s and early 1970s that technical processing and bibliographic control costs were spiraling and that less of the library budget would be available for materials and public services. Increasing concern for public service, even in academic library circles, caused many administrators to reexamine budgets to determine how to cut processing costs. Processes were streamlined, standardized cataloging was promoted, and tasks using professional staff skills were scrutinized. Automation was seen as a way to reverse the increasing costs of bibliographic control and to improve the public service operations.

As funding agencies were required to give attention to many neglected areas of society, libraries found increasing competition as they sought funds, not only to maintain the status quo, but to prevent the degradation of service and collections. Budget pressures increased during the 1970s as competition for funding and inflation combined, and federal and foundation support began to be cut back. This writer, for example, heard the vice-president of a major foundation, formerly known for its support of libraries, characterize libraries as a "bottomless pit." The tremendous emphasis on collection building in the immediate postwar era had changed by the 1970s to an emphasis on resource sharing and cooperative arrangements to facilitate interlibrary loan activities. Even our largest resource libraries no longer considered themselves as self-sufficient and began to implement cooperative programs. Resource sharing, in turn, placed increased requirements on bibliographic control systems, including access to holdings records and standardization of records. Resource sharing also has led to increased interaction between all types of libraries and the traditional differences in bibliographic control by type of library seem to be fading away. One now speaks of a community of libraries serving a community of users.

It is difficult to determine whether this new emphasis on user service, resource sharing and cooperation, and attention to special user needs is merely an expedient response in a period of economic

difficulty, or if it is a significant new trend in librarianship requiring a permanent change of direction in bibliographic control. If it is merely an expedient response, and if current pressures continue, it may well be that the new approaches will become too firmly embedded to allow significant retrenchment from the new position.

DEVELOPMENTS IN BIBLIOGRAPHIC CONTROL

Of the many changes in bibliographic control made in the last three decades, which are of major, lasting significance? This is, of course, difficult to determine since we cannot predict the future. It would seem, however, that history will note four major changes: (1) the concept of bibliographic control as a federal responsibility; (2) the bibliographic partnership between public and the private, for-profit sector; (3) the application of computers to bibliographic control; and (4) the development of library networks.

FEDERAL RESPONSIBILITY

The provision of a printed catalog card service by the Library of Congress was not, in 1901 or for several decades to follow, viewed as stemming from a federal responsibility for bibliographic control. The rationale was rather that cards could be printed if they were a byproduct of the cataloging of materials to be added to the Library of Congress collections. Although the card service expanded both in range and volume of service, generally all federal bibliographic activities prior to World War II were directly related to the mission of the agency in question.

The importance of scientific and technical information in World War II, the challenge presented by Sputnik, the growth of higher education, the increasing attention to disadvantaged citizens, and a general expansion of federal responsibilities provided an environment suitable for federal support to libraries and information services. The lack of resources available to those living in rural areas led to the Library Services Act of 1956. This act was later to become the Library Services and Construction Act (LSCA) which, particularly through Title III, Interlibrary Cooperation, stimulated cooperative projects, centralized bibliographic control, and particularly the use of computer-based systems. For example, many states have used LSCA funds to support initial installations for the Ohio College Library Center (OCLC) system.

These LSCA programs, although of great importance, only tan-

gentially related to bibliographic control. A new dimension in federal support for bibliographic control grew out of the tremendous problems that the academic library community was experiencing in the acquisition and cataloging of increasing numbers of foreign-language materials.

The Association of Research Libraries took the lead in seeking a solution to this problem; after much discussion, the vehicle chosen was an extension of the Higher Education Act of 1965 to include assistance for cataloging materials relevant to higher education. Title II-C of this law was enacted to provide such assistance. John Cronin, then director of the processing department of the Library of Congress, identified two major breakthroughs in this legislation.⁵ The first was the full recognition, for the first time, of the importance of federal aid and assistance toward solving this country's cataloging problems. The other breakthrough was the clear mandate given to the Library of Congress to provide new and unparalleled services for the benefit of academic and research libraries in the United States. Through this act, therefore, the Library of Congress was able to accelerate its acquisitions and cataloging and to give emphasis to materials added to libraries serving higher education.

Title II-C was made visible through the NPAC (National Program for Acquisitions and Cataloging) of the Library of Congress. Through this program the library began to work more directly with other national libraries and bibliographic centers. This cooperation, in turn, had implications for cataloging standards and put the concept of international bibliographic control on a firmer foundation.

These activities and others led to increasing discussion of a "national library network." Many studies, papers, and conferences in the 1960s and 1970s discussed such a network, which was generally perceived as being a federal responsibility, and hence largely federally supported. The culmination of these efforts was the establishment of the National Commission on Libraries and Information Science. To date the commission's activities have only begun to influence bibliographic control. The establishment of the commission may well be only a token action. Its current budget is such that no financial support is available to underwrite a national network; its role is largely that of coordination of currently established programs in other agencies.

Although it is easily forgotten, the idea of federal responsibility for bibliographic control and of a federally supported national library network is a radical change. Within three decades, we have moved

from the use of the Library Congress card service as a supplement to local cataloging, to the idea that the Library of Congress should catalog as much as possible and to an almost complete dependence on Library of Congress cataloging either directly from LC itself or indirectly from other vendors of LC data. We have come to believe that equitable access to information is a right, that this information is a national resource, and that the federal government should help libraries by direct support.

BIBLIOGRAPHIC PARTNERSHIPS

A major change in thinking about libraries and information occurred principally in the 1960s and 1970s: information has become a business and some have even designated it an industry. The number of groups interested in the bibliographic control field is thus increasing.

Prior to World War II there were three principal nonlibrary components in this area: publishers and jobbers, library supply houses, and professional associations and companies (such as H.W. Wilson) that provided abstracting and indexing services. Several factors combined to change this picture: (1) the increasing need for scientific and technical information; (2) the introduction of automation; (3) federal and foundation funding for research and development; (4) the increased volume of library purchasing due to federal and other outside funding; (5) the growth of higher education; and principally (6) federal support for a wide range of information activities, including grants for many abstracting and indexing services.

One area of bibliographic partnership has been the interaction between the Library of Congress and publishers and information vendors. We have become so used to seeing the Library of Congress card number printed in U.S. books that we overlook the significance and complexity of this practice which, in the early 1950s, for the first time linked the publication in hand with its bibliographic control record. From this base, we have moved on to the International Standard Book Number, the International Standard Serial Number, and after an abortive attempt at Cataloging in Source, to Cataloging in Publication. Bibliographic control, through these partnerships, is moving from a process that begins after publication to a process integral to publication.

A second area of bibliographic partnership is the information

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middleman. In this category are those companies that provide services largely based on use of data created outside the company. The bibliographic search services provided by System Development Corporation, by Information Dynamics, and by North American Aviation exemplify one type of activity; the catalog support services provided by companies such as Inforonics, Xerox, and Science Press represent another type of activity.

A third partnership is commercial assistance in developing or maintaining local bibliographic control systems. We now have companies that will convert catalogs to machine-readable form, produce book catalogs, provide packaged minicomputer systems, assist in the design and development of local automated systems, and perform other services.

In general, there is a reasonably good working relationship among the increasing number of players in the bibliographic control game. However, as this era draws to a close some of these people are becoming increasingly strident. Complex issues have surfaced, such as copyright, data base ownership and access, the roles of public versus private sectors, etc. We do not yet know the rules of the game, and can only set them as we go along. It is difficult to know whether our spectators are willing to pay the increasing cost of admission.

The interaction between so many interest groups in bibliographic control is thus forcing a re-examination of relationships, responsibilities, and traditions. At present, various interest groups—including libraries—are trying to stake out their bibliographic territories and to defend the nature, cost, and value of their services. The symbiotic relationship among all these groups and the protection of the interests of users of information need to be investigated. Perhaps we need to develop some bibliographic ecologists to ensure that we are not, through expediency and self-interest, eroding another national resource.

COMPUTERS AND AUTOMATION

It was noted earlier that, at the beginning of the period under discussion, there was use of the electric typewriter and tentatively of punched cards; at the close of this period we have many on-line bibliographic systems, including the OCLC system which links 600 libraries on-line to a data base of about 2 million records. It is impossible to evaluate this vast change in a brief review; only some of the turning points can be mentioned here.

Until the 1960s the library field was largely unaware of the ramifications of the rapidly evolving data processing field. Librarianship's initial education about the field came from the scientific and technical community, from groups such as the Special Libraries Association and the American Documentation Institute (now the American Society for Information Science) and from some lonely prophets such as Ralph Parker.⁶

The earliest uses of data processing for bibliographic control were by federal agencies and special libraries, and related principally to control of technical report literature. The technical report, largely a phenomenon of wartime activities, became an increasingly important mode of publication after the war. However, this was a genre falling outside normal bibliographic control channels. Perhaps this fact alone made it an early candidate for automated bibliographic control—there were no traditions to change. One result of these circumstances was the early and continued divergence in automation of bibliographic control. Bibliographic control through automated techniques rapidly took hold in organizations dealing with abstracting and indexing of technical report literature and, shortly thereafter, with journal literature. The lack of recognized and accepted standards and rules made this possible. Twenty years later, the problems created by this *ad hoc*, local approach are only now beginning to surface.

By contrast, the library field seemed to be moving slowly, if at all. (A notable exception was the National Library of Medicine, which had automated its indexing of medical literature through the MEDLARS project when the Library of Congress barely knew what a computer was.) Part of this lag was due to the symbiotic relationship in bibliographic control of monographs and serials, illustrated by the dependence of thousands of libraries on the Library of Congress card service. Another reason for this lag stemmed from the complexity of the relationships between bibliographic control and other library operations, such as circulation. There was considerable uncertainty as to whether a library should automate a single function, or work toward a totally integrated system encompassing all automatable functions.

Despite these problems, large amounts of library funds and manpower were allocated to automation projects in the early 1960s. Among these projects were the Inforonics study of the feasibility of producing photocomposed LC cards from machine-readable input,⁷ the work at the Washington University School of Medicine Library⁸ and the University of California at San Diego Library⁹ on automation

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of serial records, the catalog automation projects at the University of Toronto Library,¹⁰ the National Library of Medicine's MEDLARS project,¹¹ the early cooperative automation efforts at the Columbia, Harvard and Yale libraries,¹² and the automation of cataloging and circulation at Florida Atlantic University.¹³ Not all of these projects were successful, and many produced systems that have since been drastically changed. Nevertheless, these projects were of major value in demonstrating the potential of automation and in helping to educate the library field.

From 1965 to 1970, even larger projects were begun and a number of significant and far-reaching research and development efforts were undertaken. Among these were the Library of Congress MARC pilot project and the subsequent MARC distribution service, the National Library of Medicine MEDLINE project for on-line access to bibliographic records of the medical journal literature, the New York Public Library catalog automation program, projects covering a wide range of bibliographic functions at the University of Chicago and Stanford University libraries, and the formation of the Ohio College Library Center with an initial group of about fifty libraries. These major projects were dominant, but hundreds of libraries were developing local systems and using computers. There was widespread belief that most libraries of any significance would, in the future, be responsible for developing and managing their own local computer operations.

The picture changed rather suddenly. From 1972 to 1975 there was a slackening of new library computer projects and a staff cutback in many operational projects. This reversal resulted from a general reduction in research and development funding, an economic situation which reduced operational budgets and provoked a more stringent look at costs and benefits, and increasing caution about many projects which were slow in yielding benefits. Perhaps the most significant change, however, was caused by the dawning perception that individual automation projects might not be the best approach. It had become evident that automation of bibliographic control systems was complex, that the large files required were expensive to maintain, and that on-line systems would be required if immediate access to large bibliographic data files was to be provided.

In the 1970s another problem had also surfaced. Librarians frequently felt uncomfortable about placing their bibliographic control apparatus under the care of another organizational unit such as a university data processing center. Yet few libraries could afford a

large dedicated computer system—the New York Public Library, the Library of Congress, and the National Library of Medicine being notable exceptions. The rapid rise of stand-alone, packaged mini-computer systems in this period solved several problems at once: risks were lower, the need to have an in-house data processing staff was reduced or eliminated, the costs and benefits were most readily ascertainable, and libraries were able to retain a large measure of control over files, file access, and computer operations. However, these minicomputer systems were used primarily for applications which did not require large files of complete bibliographic records. The minicomputer solved some problems, but to solve the other problems, libraries turned to the library network.

One development during this period was crucial: the Library of Congress MARC format for the communication of bibliographic data in machine-readable form. MARC was well timed; it occurred after sufficient experimentation yielded agreement that a sophisticated and complete bibliographic record format would be needed, but before too much was invested in programs and files to accommodate the change to MARC. Thus, MARC was established in time to influence existing projects and, in turn, it became a potential force for new developments both in the library and in the library vendor field.

The analysis of bibliographic data in projects such as MARC gave increased emphasis to the ultimate uses of bibliographic records. For perhaps the first time in the history of bibliographic control, the input, mechanisms for manipulation and storage, communication of records, output and retrieval of data had to be considered as a unified system against which to evaluate the content of the bibliographic record. The legendary tortoise-like speed with which bibliographic rules and practices were deliberated seemed to vanish; the computer had become a unifying force. The rapidity with which catalog code revisions, the International Standard Bibliographic Description for Monographs, the International Standard Bibliographic Description for Serials, and other changes have been introduced to the field is largely due to their relationship to the machine-readable bibliographic record. Both the interaction of national libraries in projects such as NPAC and MARC, and the belief that computers might somehow assist in bringing about an international bibliographic control system were influential in increasing international cooperation in bibliographic control.

The introduction of the computer, originally regarded as a threat

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to proper bibliographic control, may be considered in the future as one of the most unifying forces in the history of bibliographic control.

THE RISE OF LIBRARY NETWORKS

In a span of five years, the astounding growth of the computer-based library network changed many of our basic concepts of bibliographic control and library cooperation. The OCLC system, with its ever-increasing number of network participants, was primarily responsible for this change.

In the invention of the library network, as exemplified by OCLC, we see the culmination of the post-World War II influences on the library field. The network provides a mechanism whereby more libraries and library users can access the United States' information resources. The network provides a mechanism whereby computer services can be provided efficiently to many libraries. The network assists libraries in achieving the goals of scientific management: lower per-unit costs, increased production, and a reduction of professional time expended on clerical tasks. The network also reduces the inequities between the information rich and the information poor. Through network participation, the smallest library has access to a data base and resource-location mechanism equal to that of the largest network member.

Of central importance is the legal basis of library networks. Whereas other forms of cooperation such as interlibrary loan were generally implemented by mutual consent, networks are generally based on a legal contract. By contract, libraries agree to follow certain bibliographic protocol, to adhere to standard bibliographic practices, and to pay for centralized support systems. Many library administrators not only manage their own libraries but now have a contractual responsibility for joint administration of a library network. Within a very short period, librarians have introduced a new organizational structure to assist in bibliographic control and other library operations. Bibliographic control, perhaps for the first time, is tending toward a legal basis. It is too early to assess the impact of the library network, but it seems obvious that the library historian of the future will identify the network as one of the principal achievements of this era.

It was pointed out earlier that the computer, first seen as a threat to bibliographic control, gave new impetus to standards and provided us with a more profound understanding of our traditional bibliographic

processes and records. Library networks are moreover already focusing on problems of bibliographic control. For the first time, we have a mechanism that gets us nearer to our goal of requiring only one-time cataloging of each title. To achieve this goal, however, the single cataloging must meet extremely high criteria for thoroughness, accuracy, and adherence to rules for both cataloging and encoding in machine-readable format. Networks expose shoddy cataloging in a dramatic way, and, increasingly, there is talk of penalizing network members for inputting inferior records. The mere idea of fining libraries for poor cataloging shows what a long way we have come in the past few decades. The existence of inferior cataloging is a challenge to our profession and one that must be solved soon.

The success of OCLC has encouraged us to believe that a national library network, comprised of regional on-line data bases, is only a matter of time—and not a very long time at that. A national network will allow librarians to rely on centralized bibliographic control and thus to give more attention to user service. Should this occur, the dominance of technical processing may give way to user services. We need to integrate network bibliographic control systems with other mechanisms such as document delivery, reference, on-demand bibliographies and catalogs, and information retrieval. It should be possible to use telecommunication networks to access human resources as well as bibliographic resources in order to provide a total user-oriented library system in the future.

The slow acceptance of automation and the insistence on standardization of bibliographic records in the library field has been noted; this approach eventually made on-line library networks possible. Thus, by the mid-1970s the library field can move rapidly toward integration of its major bibliographic functions of acquisition, serial records, cataloging, interlibrary loan, and circulation into unified systems. The early dichotomy between the abstracting and indexing field and the library field has been noted. The early acceptance of automation by the abstracting and indexing field was felt by many to be evidence of a more appropriate and responsible stance, and many funding agencies preferred to support these efforts rather than efforts in the library field. Recently, positions seem to be reversing somewhat. In a recent discussion of the feasibility of an International Science Information Network, released by the National Science Foundation, Office of Science Information Service, the major U.S. developments cited are from the library component of the information field—OCLC, the MARC format, CONSER (the Conversion of

Serials project), and other projects and standards.¹⁴ Perhaps no other recent testimony so vindicates the insistence on standardization in bibliographic control systems.

This paper has concentrated on those developments that would seem most striking to a bibliographic Rip Van Winkle who settled down in 1945 for a thirty-year nap. Although the changes have occurred gradually and are thus not so apparent to us, overall it is fair to assume that to one awakening from such a slumber they would appear incredible. These changes stemmed largely from developments outside the field. The first part of this paper dealt with the pressures exerted on us by scientists, computer experts, minority groups, and funding agencies; we were told to change. These pressures were not immediately effective and even now much remains to be done, but gradually the library field is restructuring its bibliographic control systems and is absorbing new technologies.

At first one may be chagrined to be in a profession that seems to follow rather than to lead and, frequently, even to lag well behind. Upon reflection, however, this seems to be the appropriate position for a service-oriented profession. We must be certain that change is demanded by our clientele and that they will bear the cost, then we must find a way to integrate these changes appropriately so that they will complement the enormous investment society has already made in our collections, bibliographic files, and facilities. Viewed in this light, it may well be more challenging to follow than to be out in the front. The computer experts, for example, pointed out the direction, but we were left to create the route.

References

1. "Roster of Registrants." *In International Conference on Scientific Information. Proceedings*. Vol. 2. Washington, D.C., National Academy of Science and National Research Council, 1959, pp. 1567-1606.
2. Scott, Mary E. "For Catalog Card Reproduction is Always With Us," *Library Journal* 66:197-200, Mar. 1, 1941.
3. "Punch Card System Tested," *Library Journal* 66:625, July 1941.
4. "Commercial Services: *Chemical Abstracts* Now Computer Produced," *Journal of Library Automation* 8:343, Dec. 1975.
5. Cronin, John W. "Centralized Cataloging at the National and International Level," *Library Resources & Technical Services* 11:35-36, Winter 1967.
6. See, for example Parker, Ralph. *Library of Medicine*. Washington, D.C., Public Health Service, 1963.
7. Buckland, Lawrence F. *The Recording of Library of Congress Bibliographical Data in Machine Form*. Washington, D.C., Council on Library Resources, 1965.

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8. Pizer, Irwin, *et al.* "Mechanization of Library Procedures in the Medium-sized Medical Library: The Serial Record," *Bulletin of the Medical Library Association* 51:313-38, July 1963.
9. Vdovin, George, *et al.* "Computer Processing of Serial Records," *Library Resources & Technical Services* 7:71-80, Winter 1963.
10. Bregzis, Ritvars. "The Ontario New Universities Library Project—An Automated Bibliographic Data Control System," *College & Research Libraries* 26:495-508, Nov. 1965.
11. *The MEDLARS Story at the National Library of Medicine*. Washington, D.C., Public Health Service, 1963.
12. Kilgour, Frederick G. "Basic Systems Assumptions of the Columbia-Harvard-Yale Medical Libraries Computerization Project." In Wesley Simonton and Charlene Mason, eds. *Information Retrieval with Special Reference to the Biomedical Sciences* (Papers presented at the Second Institute on Information Retrieval). Minneapolis, University of Minnesota, 1966, pp. 145-54.
13. Perreault, Jean M. "The Computerized Book Catalog at Florida Atlantic University," *College & Research Libraries* 25:185-97, 1964.
14. National Science Foundation. Office of Science Information Service. "Network News: International Science Information Networks: Projected from the U.S. Experience," *Journal of Library Automation* 8:341-42, Dec. 1975.