INTRODUCTION

In this presentation, the proceedings of the twenty-four preceding Clinics on Library Applications of Data Processing will be summarized to give a flavor of the issues and themes relating to technical services functions which have been defined, for purposes of this paper, as: acquisitions, serials control and management, and catalogs and cataloging.

In 1963, the world was waking up to a new era of technology influencing many aspects of life. Increased technology was reported to be costing workers their jobs and causing labor unrest. Cited as evidence was the fact that on February 11, 1963, eleven electronic computers took over the jobs of the many people required to tabulate stock market figures in New York for the nationwide wires of the Associated Press (Year, 1963, p. 25). Gordon Cooper was the last of the Project Mercury astronauts to go into orbit. After a successful day and a half in space, the spacecraft's automatic controls went dead, but Cooper landed safely (p. 28). At the University of Illinois on March 2, 1963, the spaceship-

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shaped Assembly Hall was dedicated—not only did its shape reflect the
times, but it was one of the first buildings in the country to make use
of sophisticated computer controls (Thomas Parkinson to Rebecca Hall,
WCIA, Channel 3 broadcast, Champaign, Illinois, 5 March 1988). The
New International Yearbook for the Year 1963 heralded the development of
thirty new commercial digital computer models, most impressive of
which was the Control Data Corporation's 6600 with a central memory
of 131,000 60-bit words, exceeding in speed and memory capacity all
available computers. Noteworthy, too, was a new computer language,
FORTRAN IV (The New International Yearbook for the Year 1963, 1964,
p. 115).

Significant events also occurred in the library world. At the Sep-
tember 1962 faculty meeting of the Graduate School of Library Science,
Herbert Goldhor, Director, had sought and received approval for the
School to hold a Clinic on Library Applications of Data Processing in
the spring of 1963 (University of Illinois, 1962). Goldhor had come to
the School a few months earlier after serving for a decade as director
of the Evansville (Indiana) Public Library. He was impressed with the
possibilities of applications of mechanization to library operations and
felt that the School had a responsibility to foster programs of continuing
education along that line (Goldhor, personal communication, February
29, 1988). By March 28, 1963, the faculty was informed that 123
applications were received for the first Clinic, and 92 were selected to
attend (University of Illinois, 1963).

A conference entitled "Libraries and Automation" sponsored by
the Library of Congress, the National Science Foundation, and the
Council on Library Resources was held at Airlie Foundation, Warrenton,
Virginia from May 26-30, 1963. One hundred people who were planning
or who had mechanization projects underway in research libraries were
invited to attend (Markuson, 1964). In 1963, Automation and the Library
of Congress was published; it became better known as the King Report,
after Gilbert W. King (1963), chairperson of the study. It, too, was
sponsored by the Council on Library Resources.

In reviewing the work of technical services in 1963, Maurice F.
Tauber (1964), writing in Library Resources and Technical Services, re-
marked "that documentation has been making a marked impression
upon more and more librarians" (p. 104). Two articles in LRTS in 1963
were devoted to library automation (Richmond, 1963; Fasana, 1963)

The 1963 volume of College and Research Libraries contained only
one major article that dealt with data processing. This article summarized
the July 18, 1963 membership meeting of ACRL's University Libraries
Section. In the article, Don S. Culbertson, Melvin J. Voigt and James
R. Cox discussed data processing costs in acquisitions, cataloging, serials,
and circulation (Culbertson et al., 1963, pp. 487-95). In his summary of acquisitions and cataloging, Culbertson concluded by noting that James Skipper, when he accepted the gavel as president of the Resources and Technical Services Division, had indicated that “the future belongs to technical services.” Culbertson thought Skipper to be right. “Unless”, remarked Culbertson, “we get our costs under control and become able to keep them there, the whole library risks belonging to technical services” (p. 489). Little wonder, then, that in reviewing the first Illinois Clinic, Carl R. Cox (1965) acknowledged that, for the most part, “all applications of data processing to date have been in the area of the library’s housekeeping operations, technical services, and circulation” (p. 409). The Clinic’s early presentations concentrated on technical services operations. The conferences were first intended to present papers from librarians from various types of libraries with sufficient relevant experience in the mechanization of library operations to make their findings of value to others through case reports of their experiences (Goldhor, personal communication, February 29, 1988). And Goldhor noted in the “Foreword” to the first volume, the strong emphasis was on “routines” with little emphasis on information retrieval and none on information storage (Goldhor, 1964, p. iv).

SYSTEMS APPROACH

The routines of library processes, as Burton W. Adkinson (1963) remarked in the keynote paper of the first conference, were not simple problems to solve in machine systems. He noted the trend toward realizing that “a library performs many services which can best be approached from a systems point of view” (p. 2). This approach assumed that machine records in one operation, for example, acquisitions, could be used for cataloging, circulation, selective dissemination, or information retrieval. Adkinson saw this approach as sending librarians back to “first principles” and studying in detail the basic input record for each item in the library (p. 2) as each library built its own stand-alone system.

The systems approach required an understanding of an existing system, not to mimic that system, but to be sure that all parts of the process were taken into account. A relatively new tool to librarians, but one which could become the link between them and the “machine people;” was the flow chart designed to be “a graphic representation of a procedure’s flow, showing the decisions that need to be made and the actions that must be taken to complete a particular task or series of tasks” (Schultheiss, 1962, p. 79). The sequence in which tasks were to be carried out was another important feature of flow charting.
Louis Schultheiss (1964) introduced the first Clinic's audience to flowcharting, a device that would become an integral part of the papers of many Clinics to follow, particularly in regard to technical service activities. Not only was it seen as a method to advance the systems approach and define the process for "machine people," but, as Jane Burke (1986) indicated in her Clinic presentation twenty-two years later, flowcharting was a good way to involve all levels of the staff in the human aspects of library automation because it is a "group process" that holds people together and facilitates communication at different levels (p. 51). Thus flowcharting has endured to facilitate both human and technical activities.

**Acquisitions**

Many of the early efforts in automating acquisitions were part of the early system approaches. At the first Clinic in 1963, five papers included material on the automation of the ordering of books, with three of them indicating that information generated in the order process was used also for cataloging processes. In these early years of the Clinic, it was not uncommon for a system to have begun as either an ordering system or a cataloging system and subsequently to have had the other activity added to it. Along with generating orders and creating lists of materials on order and lists of materials in process, a number of these early systems also handled billing and payment operations, printed labels and book cards, and performed other routine tasks. Approximately one-third of the presentations made in the first three Clinics, 1963-65, included coverage of automation activity relating to acquisitions. Though small in numbers compared to the entire population of librarians, there were librarians at that time trying out and using data processing in very sophisticated ways such as Lorin R. Burns (1964) reporting on the acquisitions system of the Lake County Indiana Public Library; Ralph Parker (1964), reporting on the University of Missouri Library; Hillis Griffin (1964), on the National Reactor Testing Station Technical Library; and Walter Curley (1966), on the Suffolk Cooperative Library. An interesting sidelight on this is that a book jobber, in relating his firm's experiences in automating, indicated that, during this period, there was need for special programming in order to provide for the interchange of data with libraries using data processing (Brody, 1966).

During the later 1960s, several libraries reported on other interesting and significant developments in the automation of acquisitions as part of planned integrated systems. One of them was included in Charles T. Payne's (1967) description of the genesis of the bibliographic data system of the University of Chicago Library. In this system, all activity
relating to a title was linked to a single record which served for controlling all aspects of the use and treatment of the title. At the time of Payne's report, the system was not fully operational and his presentation dealt with identification of bibliographical data elements and their manipulation in the system, and acquisitions was not his major emphasis. A subsequent report on the Chicago system made in 1970, at the beginning of the MARC era, included a section on acquisitions (McGee & Miller, 1971, pp. 78-97).

Another interesting integrated system known by the acronym LISTS, was introduced in Los Angeles in 1968 by the System Development Corporation (Black, 1969). Used by the technical library of the System Development Corporation and a limited number of libraries in the Los Angeles area, this system was developed to determine costs of operating online systems and to determine acceptable cost levels for such systems. It was based on MARC records, and though not fully operational at the time of the report, was intended eventually to perform ordering and order control functions together with cataloging and circulation, as well as being designed to produce a great deal of management data on all phases of its operation.

Washington State University also was developing an integrated system, and, as described at the 1969 Clinic, its acquisitions subsystem was not yet operating, but a number of criteria for it had been identified and were outlined in the report as including: collecting necessary order data at the beginning; provision for effective file management and immediate and continuing updating of information in the files; utilizing both online and batch processing; immediate inquiry from many access points; provision of as much automatic processing as possible (e.g., automated editing of old outstanding orders and automatic removal from the file when materials were no longer in processing); development of management information on the acquisition process; flexibility of procedures; simplicity of operation; and potential for expansion to handle increasing numbers of orders (Burgess, 1970).

The linking of acquisitions with cataloging continued as a pattern throughout the latter half of the 1960s, but these years also brought a limited number of full-length presentations describing acquisitions systems in detail. The first of these long reports is in the 1968 Proceedings and describes an automated order system in operation at the University of Michigan (Thomson & Muller, 1969). The report, made after the system had been in operation for two years, described the care with which the manual system and the library's needs for information on its acquisitions activity had been analyzed and flowcharted before any programming had been done. The system, based on punched cards and batch processing, had proven itself in use, had absorbed increased order
activity, had controlled staff growth in the acquisitions unit so that additional space was not required, and was judged successful on other counts as well. One interesting conclusion made at Michigan was that comparing costs of operating this system for one year with another was difficult because the amount of activity varied too greatly from one year to another for such comparisons to be valid.

The Georgia Tech Library, in the late 1960s, reported that it planned to expand its MARC-based cataloging system into other areas, including book selection by generating, from each week's new MARC tape, printouts of records in a particular classification area for each of a corps of selectors (Kennedy, 1969). Ultimately this library intended that its system would include selection, ordering, and cataloging all based on the MARC records. The idea of breaking out segments of the records in particular LC classification segments harks back to the preautomation use of LC proof slips for selection and ordering purposes.

Thus, with the appearance of MARC and the proliferation of catalog projects which were spun off it, acquisitions almost disappears from the proceedings of these Clinics except for a pair of papers in 1972 describing online systems called LOLITA and BALLOTS. Upon reading the account of LOLITA's origin and operation, it appears to have been a friendly and helpful adjunct to the Oregon State University Library's acquisitions program (Auld & Baker, 1972). LOLITA was, of course, an acronym for a much longer and less catchy name for the system which was an online book order and fund accounting system that had been in operation for two years. It automatically indexed in an overnight operation those orders input during the previous day so that they thereafter were searchable by author as well as by order number. As invoice information was input each day, it was automatically linked to the original order record, and there was provision in a special file for entry and control of invoice data relating to subscriptions, standing orders, and binding, a feature which enabled the acquisitions unit to consolidate all its accounting work in the system. LOLITA was indigenous to the Oregon State campus and its terminals could be operated only within a very limited distance of the OSU computer center; however, because others were becoming interested in it, there was interest in freeing LOLITA of these constraints. LOLITA was considered to be a success. It existed in a dynamic environment and continued to benefit from continual change and improvement.

BALLOTS, which originated at Stanford University, differed from LOLITA in that it was designed from the beginning to be a total integrated system and it was so described in a report by A. H. Epstein and Allen B. Veaner (1972). At that time, the system was still being developed, and the report described the acquisitions module which was
the first of eleven projected segments to be programmed. In the system, MARC records stored on tape and updated weekly were extensively indexed to permit ready online searching by terminal operators. Inputting author or author/title information enabled one to initiate an order after which the system edited the information which had been entered, indicated errors and omissions, and, finally, accepted the complete and corrected record. At that time the operator could proceed with the entry of another order. Orders were printed overnight for dispatch to vendors. The then–novel idea of the cursor to mark the operator’s progress was described in some detail as was the use of special keys on the terminal for special purposes. This latter feature was an early manifestation of function keys now so familiar to all using personal computers.

Serials Control and Management

Serial control is a recurring topic in many papers presented, particularly in the initial decade of the Clinics. It crops up in connection with plans for integrated systems and in individual libraries’ lists of areas which had been or which were to be automated; however, few institutions or individuals made full-scale reports of the development of serial control systems. Parker (1964), in the first Clinic in 1963, indicated that machine control of subscription records at the University of Missouri Library was an accomplished fact; and, in that same conference, two separate reports on automation efforts in different libraries indicated the use of data processing techniques to route periodicals to patrons and to prepare periodical lists (Griffin, 1964; and H. Griffin, 1964). Proceedings of the first conference also contain one of the long papers detailing automated work with serials in Seymour I. Taine’s account, in 1963, of the development of the indexing programs of the National Library of Medicine (NLM) (Taine, 1964). While not a serial control system, the early development of automated systems at NLM for its index publication program was a pioneering effort in the use of automation in libraries and gave results which are now recognized both as basic to the growth of information services in medicine and of library applications of data processing in general. These developments at NLM also are indications of what can transpire if both planning for and funding of library automation are adequate and consistent.

In subsequent years serial holdings lists and serial control systems continued to be included in descriptions of automation projects in particular libraries or were mentioned as projects under development or still in the planning stages by those reporting on the development of comprehensive systems. A short description of a serial control system
within a longer paper outlines the use of a minicomputer as the base for the development of an online integrated system in the University of Minnesota's Bio-Medical Library (Brudvig, 1974). This is actually a manifestation of a later era incorporating much more sophisticated equipment than was in use in the early Clinic years.

Robert Kozlow (1968) reported on the serial holdings list of the University of Illinois at Urbana-Champaign Library. This is the only paper in the proceedings devoted wholly to the generation of serial holdings lists and contains a detailed description of the techniques, based on punched cards, utilized in publishing a truly large listing of this type.

Conferees in 1972 heard a detailed report on the development and operation of the "Terminal Oriented Real Time Operating System (TORTOS), an online serial control system at the UCLA Bio-Medical Library (Fayollat, 1972). This system was designed to eliminate card handling and to keep the database current on a daily basis. It was reported to be cost-effective and to be providing measurable advantages over a previous batch system. The system was still under development at the time of the report and there were plans to include processing of invoice information in addition to controlling holdings.

The last full-length presentation relating specifically to serials was in 1973, when Charles Sage reported on the utilization of the MARC II format for serials in standardizing the handling of machine-readable serials records by the three state university libraries in Iowa (Sage, 1974). This effort succeeded in converting all three sets of serial data to a common format and in producing lists of the serial holdings of each of the three libraries using the MARC formatted records, but it did not succeed in producing a union list without the intervention of human workers to match titles appearing in more than one of the individual databases.

This partial success ends this account of the history of serial data automation as reported in these Clinics. By the early 1970s the utilization of MARC records, the beginnings of work on making online catalogs, and the coverage of other themes in the Clinics had assumed such proportions that the automation of serial records and acquisitions procedures disappeared from the agendas of the conference. In general, acquisitions and serials systems in the online environment have not become as prolific as might have been expected. In a recent study of 209 four-year academic institutions in the United States, it was found that 169 (80.9 percent) did not have online acquisitions systems; of the 41 that did, 20 used a system supplied through a bibliographic utility. Only twenty-six (12.5 percent) had an online serials control system with no single type predominating (Camp et al., 1987, pp. 341-42).
(These findings are corroborated by a 1986 survey conducted by the Association of American Publishers/American Library Association Resources and Technical Services Division Joint Committee which found that few of the wholesalers provide electronic ordering systems for use by libraries (Edelman & Muller, 1987). In addition, Marcia Tuttle has noted that serials acquisition had been considered a likely place to begin automation activities but that “systems designers did not understand serials; the high incidence of exception to the rule made automation of serials receipt too difficult for existing technology. Thus, most data processors turned to cataloging and other library functions” [Derthicke & Moran, 1986, p. 14]).

In reviewing the past quarter century, Jim Segesta and Rod Hersberger (1987) note the revolution in automated cataloging and reference services through OCLC, BRS, Dialog, SDC, etc. and remark that collaboration between the book trade and libraries has not materialized. The integrated systems approach diminished over the years. Gerard Salton (1980) would speak to the impressiveness of some integrated systems while acknowledging that “the recent trend in the direction of cooperative ventures among libraries has somewhat damaged the enthusiasm for the integrated stand-alone systems, and the feeling now seems to be that they are too costly to be supported by single library organizations without substantial outside aid” (p. 61). Michael Gorman (1987) concluded that there were few, if any, truly integrated systems in medium sized or large libraries although many libraries had created a hybrid of partially integrated and partially separate systems. The choice has always seemed to be “between the complex architecture of the integrated system and the user hostility of the separate system approach” with the microcomputer making possible a third choice (p. 4). Perhaps in another twenty-five years truly integrated systems will have come into their own, and acquisitions and serial control may have again become familiar themes in the literature of library automation.

Catalogs and Cataloging

Format

Mechanized and computerized means affected cataloging and catalogs in several important ways. Three ways will be emphasized here: the format of the catalog, the methods of distributing and the degree of sharing cataloging data, and the catalog users. All of these are intertwined in the collage that will be developed from the pieces presented in the Clinic's proceedings.

The pieces began to form in the 1950s and 1960s when, with the advent of better mechanized means promising to produce a much higher
quality product (Stromberg, 1966, p. 196), libraries reinvented an old format, the book catalog, in an attempt to cut costs and provide better service. Remembered were many advantages of the book catalog (Stromberg, 1966); seemingly forgotten were disadvantages which did not disappear. Among the reasons cited for this movement back to the book catalog after seventy years of card catalog reign were cost factors such as elimination of the preparation of card catalogs for multiple locations and the maintenance of card files. The freeing of prime space occupied by card catalog cases was an extra benefit as was the saving of staff time coming from the elimination of catalog maintenance costs for typing cards and headings, sorting, filing, and reviewing. And who could quarrel with increased service that multiple copies could provide for all internal services to staff and users as well as external service to branches, other libraries, and users in their homes and offices? In addition, advancements in technology made for a much higher quality product.

Faced with providing service to a burgeoning population and the opening of new branches without catalogs, the Los Angeles County Public Library, in 1952, turned to the production of book catalogs. A report on the Los Angeles catalogs was made by John D. Henderson (1964) at the first Clinic. Like many of the early Clinic papers, this one went into great detail about basic designs of tabulating cards and the equipment used. Four years later the Clinic included another paper chronicling the progress of the Los Angeles book catalogs from unit record (punched card) equipment, to sequential camera processing, to preparations for conversion to a computerized system. This was indicative of the changes that were occurring in technology (Zuckerman, 1968).

Other early Clinics reported the changing means for mechanized book catalog production in all types of libraries. Even by 1976, Maurice J. Freedman (1977) was having a difficult time giving up the book catalog, although by then, he was admitting that the book format was more costly and more quickly outdated than its newer format rivals such as the Computer-Output-Microform (COM) catalog (p. 120) which was enjoying a brief interlude in the format limelight on the way to the online catalog and which was the subject of a report at the same Clinic (Maliconico, 1977).

The physical format of the catalog has been noted but the word format took on a new meaning in the machine era. Everyone knew that the bibliographic content of records could vary considerably, but as libraries developed stand-alone mechanized systems, there were other variations in machine-readable records. Ann Curran (1970) summarized some of these variations including the recording of the data (e.g., Is it in natural language, coded form, or both?); the determination of items
that are to be separately identified in the record; the manner of identification of these items (as tagged fields, subfields, etc.); the structure of the machine records (Are the identifying tags interspersed with the data?); and the character set used to represent the data (p. 38). Lack of standardization in these areas precluded the ready exchange of bibliographic data in machine-readable form among libraries. There were some cooperative efforts to produce technical services products reported at the early Clinics, such as the Harvard-Columbia-Yale medical libraries project (Kilgour, 1965), the Suffolk Cooperative Library System (Curley, 1966), the Los Angeles school systems (Dodendorf, 1966), and the Ontario New Universities Library Project (Bregzis, 1966).

To facilitate the development of a national library system, the 1963 King Report had emphasized the conversion of information from textual form to machine-readable form as a necessary step for both the transition to an automated system and its continual updating; but, at that date, team members admitted that they did not know the techniques to be used in the conversion (King et al., 1963, p. 9); by 1967, when Barbara Evans Markuson (then Chief, Library Methods Staff, Information Systems Office, Library of Congress, who had edited the 1963 Airlie Conference proceedings and assisted the King Report team) introduced MARC into the Clinic proceedings, a few volunteer libraries had been receiving machine-readable data in the MARC I communications format from the Library of Congress since November 1966 (Markuson, 1968, p. 106). She saw the new system as one likely to influence the future characteristics of the national library system or network (pp. 111-12). And she was correct, for with MARC, a whole new era of library automation had begun and one would have to look hard to find a Clinic after 1967 that did not include that now-familiar acronym somewhere in its pages. At the next year's Clinic, John P. Kennedy (1969) described Georgia Institute of Technology's use of the MARC Pilot Project tapes to produce catalog cards and book catalogs as a highly successful experiment that increased production; but he also noted the expensive development costs, the difficulty of obtaining programmers, the lack of documentation, and the arduous process of testing and debugging (pp. 199-215).

The Library of Congress continued work on the format that facilitated the machine-readable interchange of bibliographic data between institutions and, in 1969, began to distribute, through the MARC Distribution Service, its cataloging services on machine-readable tape. Eager to report how libraries were using these services, the planners of the 1970 Clinic departed from the past consideration of all major aspects of library operations in a particular Clinic to concentrate on one theme, MARC, which had implications for many different library operations.
(Using a special theme for each Clinic has continued ever since.) The 1970 Clinic’s intent “was to review MARC after one year of operation, to present the current picture and future programs of the Library of Congress in regard to MARC and to assess the local, national, and international potential of this service” (p. ix).

Henrietta D. Avram (1971) spoke on the purpose of a data-oriented, computer-based centralized service with emphasis toward generalized applications on a centrally maintained set of data files for access by a variety of users. She saw the evolving MARC system as part of this data utility. Hillis Griffin (1971), a distributor of the MARC tapes to local libraries and a MARC user, praised some users for their hard work but chided other subscribers for lack of initiative in using MARC. By 1970, MARC was “international” and the British MARC program was described by R. E. Coward (1971). Other library and commercial users of MARC rounded out the group. In general, the users characterized MARC as being timely, sophisticated, difficult to manipulate because it had never been done before, eminently usable, and requiring hard work. The concept of distributing data in this fashion was viewed as being so radical as to require rethinking of each individual library operation as part of a total system because each aspect of library administration would be affected by MARC (McGee, 1971, p. 96). Most speakers shared Fred Kilgour’s (1971) optimism for the future of library automation which he evoked in the conference’s closing presentation. As Michael Gorman (1977) discussed conversion of existing bibliographic files into machine-readable form, he presumed that the format in which the records would be received would be the MARC format—or at least a MARC-compatible format (p. 125). In a short space of time, MARC had, indeed, become the standard and changed much of the direction of library automation.

Methods of Distributing and the Degree of Sharing Cataloging Data: Networking

One of the problems in using machine-readable data distributed in MARC format by the Library of Congress was that most local libraries didn’t know what to do with the data once they had it, and/or they did not have the expertise or the equipment to process it. Library rumor has it that some purchased the tapes merely as a status symbol—to be able to answer affirmatively when, at library conferences, one was asked “Are you getting MARC tapes?” and then quickly remember another appointment before being asked “What are you doing with them?” Too often the answer to that would have been “putting them on a shelf.”

Would cooperative efforts be a way for libraries to process and use the data? At the 1968 Clinic, Frederick G. Kilgour (1969) reported on
the Ohio College Library Center (OCLC), a project that he made clear was for the development of a system to build a union catalog for Ohio's research libraries through a regional library center and whose first major project would be a shared-cataloging activity. In retrospect, this paper provides a clue to the role that OCLC (which would several times change its name but fortunately not its initials) would play in future networking, as it is now called. He announced that "[a]t the present time, OCLC is not pursuing the mission of furnishing computation, but it has gently opened the door for access to this mission and will actively develop in this direction should the demand arise" (p. 82). Here, too, is set forth Kilgour's well-known philosophy for the making of personalized libraries for each user and his concept of OCLC as a node in the network of computerized textual material that would bring bibliographic resources close to each user (pp. 83-85).

In 1968, Kilgour also commented on the lack of techniques to organize a huge file of bibliographic entities and to provide the various indexes required for the envisioned system; also, terminals efficient enough for editing cataloging copy were nonexistent (p. 87). But new technology would overcome these problems and in October 1971, OCLC member libraries began to input new bibliographic data from their own terminals into the system (Long, p. 169). (The authors were privileged to be in Columbus to see OCLC in its first week of operation at this level.) "By February 1972, a system which permitted the smooth interaction of both member-created records and those from the Library of Congress was active for all but a very small percentage of Library of Congress records" (p. 169). By 1973, the OCLC cataloging system was servicing more than ninety terminals (seventy-five of which were in Ohio) while concluding cooperative agreements outside of Ohio with NELINET (New England Library Network), FAUL (Five Association University Libraries), PRLC (Pittsburgh Regional Library Center), PALINET (Pennsylvania Automated Library Network), and CCLC (Cooperative College Library Center). Installation of terminals in those libraries would double the number of operating online terminals (p. 169).

The extension of OCLC services to other groups throughout the nation grew, as did the database which eventually received data from hundreds of other libraries. OCLC produced (and still produces) many catalog cards—as well as many other products. Today, it would seem odd to hear a major paper at the Clinic describing the urgent needs of the Library of Congress Card Division. Yet Stephen Salmon (1970) presented such a paper at the 1969 Clinic for, at that time, LC was distributing over 110 million cards annually or about 1,000 cards every minute (p. 68). Today the needs of libraries still using cards are much more frequently met by the bibliographic utilities than by LC.
Although criticizing the bibliographic utilities for prolonging the card catalog's existence, Michael Gorman (1980) saw the producing of card catalogs by the utilities as a "transition" stage in library automation that, at the very least, had created "massive, centralized machine-readable data bases and individual machine-readable records" (p. 50). As early as the 1973 Clinic, Estelle Brodman (1974) heralded OCLC as one of the three most successful networks in librarianship. (The other two were LC's sale of catalog cards and NLM's MEDLINE.) This success, she believed, came because, in each of these three cases, the librarian could take standardized material and modify it in any way he or she wished (p. 21). When the 1976 Clinic attacked the problem of "Economics of Library Automation," Frederick G. Kilgour (1977) cited OCLC as an example of the computer's enhancing the productivity of library staff and reducing the need for complex codes such as the Anglo-American Cataloging Rules (pp. 6-8). Contrary to what might earlier have been expected, Kilgour thought that "[w]ith networks the national library will be made up of the nation's libraries, not any particular library" (p. 7).

Users and Online Catalogs

By the 1972 Clinic, I. A. Warheit (1973) was noting that "[I]ibrary technology is moving in the direction of on-line interactive processing" (p. 20). The central advantage was in bringing the information directly to the user so that he/she would not have to spend time and energy going to various sources (p. 16). The successful use of an online cataloging system was reported at that conference (Miller & Hodges, 1973). BALLOTS, the online interactive library automation system that would support the acquisitions and cataloging functions of the Stanford University Libraries' technical processing operations, was also described (Epstein & Veaner, 1975).

As it became apparent that many traditional manual catalogs would eventually give way to online computerized catalogs, librarians became concerned about how that new catalog would look. Would it mimic the traditional catalog, or would it become a very different catalog? How would it affect library catalog users, a long neglected group? At the Yale University Library, a research project carried out from 1967-69 had as its goal to "learn what a future catalog should be by studying, quantitatively, what our library patrons are trying, successfully or otherwise, to get out of our present catalog" (Lipetz, 1970, p. 43). Preliminary results of the study were reported at the 1969 Clinic.

The Yale study was performed with card catalog users, and R. G. Braithwaite (1979) reminded those attending the 1978 Clinic (as others before and after him did) that making an automated catalog did not
mean automating the card catalog (p. 63). Getting rid of card catalog limitations, however, would introduce new computer-dependent limitations. In addition to technical problems, Braithwaite cautioned that there were problems because of the expectations of users who hold firmly to the belief that ‘‘the computer is a god and that its priests can do everything in no time at all’’ (p. 64).

In the Clinics of the late 1970s and early 1980s, it became more and more evident that more speakers were telling us that technology alone would not be enough to make online systems user friendly. Reference databases had presumed intermediaries would intervene (at least in the early stages) between users and databases, but from the beginning online catalogs were expected to be direct access tools for library users. These new means of service required not only an understanding of the capabilities and limitations but also an understanding of users for whom the systems were to be designed. Ward Shaw (1981) pointed out how little was really known about the design of public access systems. How to construct systems where hardware, software, people, and data would interact effectively would be a prime concern as online catalogs became realities. Principles of design of catalogs that would consider how fast a system should respond; how much data, and in what detail the data should be presented; how much should users become involved in or control the interactive process; and when should the system quit, were essentially new problems for the librarians to consider (pp. 3-4). All of this was complicated by the fact that librarians, in the words of Shaw, ‘‘don’t know exactly how to produce informed (or satisfied) users; that is to say, we do not understand the mechanisms by which uninformed users are transformed into informed users’’ (p. 5). There was no escaping the need for a clear identification of goals and procedures to define the system, always within the context of a changing environment as new components became available (Avner, 1981, p. 18).

Studies to tell us more about users might be a new role for the library networks and, indeed, they accepted that role. Christine Borgman and Neal Kaske (1981) reported on a study to determine the number of terminals required for the Dallas Public Library catalog. While Dallas was the site of the study, the analysis of the collected data was done by computers at OCLC. The researchers did not attempt to extrapolate Dallas data to other libraries, but the results of this study did seem to confirm that usage of an online catalog was not the same as that of a card catalog (p. 35).

Studies at OCLC reported by Mary Ellen Jacob and Neal Kaske (1983) noted the connection between management information systems and online catalogs, which when used together, could, in the words of
the reporters, "create an atmosphere for 'user studies deluxe!' The record of use that it is possible to create from an online catalog provides a library's management information system with accurate data on how the catalogs are being used by patrons" (p. 118). Through use of questionnaires, focused-group interviews, and transaction logs and activity reports, these studies revealed a number of barriers which prevent library patrons from effectively (or ever!) using library catalogs. The barriers included factors concerning the computers themselves, the system's language, and the bibliographic information (p. 119).

The design of interactive computer systems must consider more than bibliographic data as we have already intimated—how to manipulate the keyboard and how to deal with the information displayed must also become considerations. The content of the Clinics did not neglect these human considerations. Gregg Vanderheiden (1981) reported on methods to enhance, modify, and design terminals for access by the visually, physically, and cognitively disabled. W. David Penniman (1982) and his colleagues showed OCLC's concern in this area by discussing trends in input/output devices to improve displays and provide better access. While they saw room for much improvement, they felt the human factor would be the key to major improvements (p. 72). By the time an entire conference was devoted to Human Aspects of Library Automation (D. Shaw, 1986), four of the ten papers dealt specifically with the concern for library users' access to automated catalogs. Anne Gilliland (1986) discussed user reactions to online catalogs and indicated managerial decisions that should be considered regarding physical and intellectual aspects of online catalog access while Susan Roman (1986) delineated means that could be employed to enhance online catalog services for children and youth. Leslie Edmonds (1986) considered the needs for hardware and software designs for online systems that would serve physically disabled persons, the elderly, and non-English speakers, and Mark W. Arends (1986) gave helpful advice for designing instructional brochures for online catalog users.

The interest in human/computer interface continued in the following year with an exploration of user friendly as it applied to online catalogs and other library tools. Ward Shaw (1987) defined the goal of user friendliness as being "to provide a powerful, flexible, informative way for users to drive and control the system to their various ends" (p. 13). No easy task, according to Emily Fayen (1987), for users of online systems where an effective user interface "has to deal with complex record structures, data types, and files" and must provide "a comfortable tool for the occasional library user as well as the experienced staff member" (p. 55). Like others, she called for further research to build on that already completed in online catalog studies. Specifically, online
catalog makers needed to be able to benefit from research that gave clues about the following questions: In what order should bibliographic records appear and should that order be the same for staff and public users? What fields of data should appear for each bibliographic record? What techniques work best to help users whose search strategy nets too few or too many results? How can one determine whether no hits for a search represents system failure or database failure? What is the best way to explain the basic idea of retrieval of sets to library users (pp. 58-59)?

At the same conference, Gary Golden (1987) extolled the use of microcomputers as public terminals at the University of Illinois at Urbana-Champaign Library. Interface programs in the microcomputers translated the natural language queries of users into the commands of the system, setting up interactions between the micro and the mainframe computer and making for a more user-friendly system.

As the progress of the catalog through the last quarter of the century is charted, some interesting observations come to mind. The familiar format of the catalog has undergone several major changes. Old ways have been discarded only to be rediscovered in new settings with new technologies. Catalogs have moved from being tools describing the collection of one library to tools describing the collections of a network or networks. Cataloging has become a truly shared effort—perhaps too much so—fostering a uniformity in many cases when it need not have been necessary to do so. There is a sameness in today’s bibliographic data that speaks to the failure of extending the bibliographic content of the traditional record to being even more useful freed from the constraints of the 3 x 5 card. One frequently repeated message of Kilgour’s was forgotten: that standardization and uniformity need not be the same. Users have gone from passive receivers in one location to interactive participants with catalogs available in a variety of locations. Users have managed to adapt to the new format, but their expectations have also increased. They thought all along that the computer would bring them a total bibliographic apparatus.

The 1980s became the decade of the online public access catalog (OPAC) but had we too soon become complacent with it? At the 1987 Clinic, Charles R. Hildreth (1989) summarized the development of the first generation online catalogs as tools consisting of derived key input, exact term or phrase matching, and lacking subject access. There was little in the way of online user assistance; no authority based searching with cross references was available; and meaningful browsing facilities were lacking, leading to criticisms that OPACs were actually inferior to the traditional library catalog. To Hildreth, in today’s second-generation online catalogs, the traditional well-structured library catalog has joined
with the power and flexibility of conventional information retrieval systems. Cross references are joined with information retrieval keyword and Boolean searching approaches. Searches can be restricted to specified record fields, character masking, and/or right hand truncation. Limits can be made by date, language, and place of publication. Records can be viewed and printed in a number of different display formats. Still, Hildreth finds much room for improvement. Even the second generation OPACs place the burden on the user to reformulate and reenter searches until satisfied. There are too many failed searches, too much confusion and frustration for users during the search process, unfamiliarity with or ignorance of the subject indexing, misunderstanding and confusion about fundamentally different approaches to retrieval and search methods, and missed opportunities to retrieve relevant materials. There is no automatic assistance with alternative search strategies and no leads from successful free-text search terms to corresponding subject heading or class numbers assigned to a broader range of related materials. The resulting bibliographic displays don’t provide sufficient information to enable the user to judge the usefulness of documents, and there is no ranking of citations in regard to relevance to the user’s search criteria. Hildreth concedes that too much focus has been placed on system performance factors with human searchers having been left out of improvements, and that there are still many technical, economic, and human problems to be solved before OPACs can be viewed as information retrieval systems and not just mechanized card catalogs. While some OPACs have the tools to integrate periodical and citation indexes into their catalogs, they cannot meet the price demanded by commercial suppliers of indexes and book review files. Yet Hildreth remains optimistic even though he sees current online catalog development as having slowed to a “snail’s pace.” The obstacles to the one stop, self service, information access and delivery station will be overcome in time. “The OPAC,” he concludes, “has truly created an avalanche of possibilities and unleashed our imagination” (p. 32).

It appears, then, that this 25th conference is yet another link (albeit interface) in the journey begun in 1963 to see how catalogs have been affected by automation. The 25th conference includes two sessions relating to catalogs. As systems continue to develop, we expect that catalogs will be a continuing topic.

Technical Services: New Roles, New Organizational Patterns

Automation in libraries brought new roles, new organizational patterns, new requirements for technical services librarians. All these were parts of the Clinics. Librarians became involved in complex
negotiations for contracts between libraries and other organizations such as regional networks for bibliographic utility services. Governance structures became important considerations, too (Evans, 1978). Librarians who developed databases found themselves in new roles as vendors when they shared the database with others (Upahm & Wilcox, 1978).

Michael Gorman (1980) saw the integration of some processes and the increased role of cooperation and resource sharing as eliminating the need for division between public and technical services such as had existed in the past. Separate sections for handling special types of materials became unnecessary as organization by function rather than type of material became the norm. Nonprofessionals would perform much of the work while professionals would become policy makers and, to a limited extent, supervisors. All of this would result in a rethinking of the role of professional librarians.

When competencies for the new technologies were considered for the 1983 Clinic, Kathryn Luther Henderson (1984), from a review of the literature, a survey of individuals working in technical services positions, and an analysis of position announcements identified the competencies for technical services personnel as falling into two broad categories: (1) general, technical, and bibliographic; and (2) management, supervisory, and communicative (p. 13). Persons with analytical minds, problem solvers, decision makers and leaders would be a necessity. Such persons would need to be inquisitive, curious, imaginative, and creative. The technical services required adaptable and flexible persons amenable to change—as well as dreamers that envision new and better tools as the means to better service for users. In all of this, they should not lose sight of the purpose of their work (p. 36)—a point stressed at the first Clinic.

CONCLUSION

In the span of twenty-five years, many changes have occurred not only in technology but in human perceptions of library automation. Automation is a fact. Mistakes have been made and successes achieved. Some dreams have become realities while others faded upon rude awakenings. Some systems have been celebrated at their conception but secretly aborted and never heard of again. (Praise to the 1978 Clinic that was brave enough to admit to and record problems and failures! [Lancaster, 1979]) Unit record equipment, mainframes, minis, and micros have been a part of the progress and failure. Going it alone changed when the new technology could not be harnessed and managed on one's own. Acquisitions and serials management envisioned as prime
candidates for automated activities in 1963 did not flourish in the way that cataloging did. The lowly catalog, doomed to extinction by earlier prophets, now seemed destined to become the more comprehensive tool that librarians in the mid-nineteenth century envisioned but gave up when catalog formats were more cumbersome. A new era of sharing emerged. Librarians took on new roles and realigned old competencies. Renewed emphasis has been given to library users and systems responsive to their needs. Yet there is much left to be done.

All of this has affected the functions, the organization of, and the people associated with technical services as have been mirrored by the content of the past twenty-four Clinics. Despite the fact that many factors influence the content of an individual conference, these Clinics, as a whole, have in many ways been ahead of their time in topics covered in their presentations and provided rewarding, educational experiences.

In a scenario in the 1979 Clinic, F. Wilfrid Lancaster, Laura S. Drasgow, and Ellen B. Marks saw a dwindling away of the technical services in general by the twenty-first century (Lancaster, 1980, pp. 179-81). That will be for the speakers at the fiftieth anniversary in 2013 to comment upon. The authors, who have together accumulated and enjoyed over six decades of work in the technical services or teaching others about those services, rather hope that scenario will not totally be played out.

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