Libraries, Technology, and the Need to Know

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SUMMARY

The library, as a social institution, has progressed from the concept of serving only the scholarly to the present-day practice of reaching people of all ages from all economic levels in different environments. The research now in progress is directed toward the role of libraries in national information systems. Computers and related equipment are used in two main types of information activities: "document" processing and "content" processing. From the sixties on, libraries in the USA granted their access to computers, began to plan in terms of systems development, integrated systems and networks. One of the most advanced and successful operations in the USA is the OCLC (Ohio College Library Center), which incorporates the use of MARC tapes. Librarians and information scientists of Brazil already recognize the potential of computer technology and the "need to know". The first advanced course on Information Science, leading to the Master's degree, was introduced in 1970 at the "Instituto Brasileiro de Bibliografia e Documentação", in Rio de Janeiro, granted by the "Universidade Federal do Rio de Janeiro". Several aspects of this course of study are indicatives of innovation and far-sighted planning in Brazilian librarianship.

For centuries libraries throughout the world have provided the conventional means for bringing recorded information and people together. They have slowly but steadily progressed from the concept of serving only the scholarly to the present-day practice of reaching people of all ages from all economic levels in different environments.

The library is a social institution. To fulfill its true responsibility, it must reflect the society of which it is a part and each significant change as it occurs. Within the last 25-30 years changes both significant and extensive have occurred with unprecedented frequency and consequences. This has been especially true within my own country, the United States of America. Library services in the United States are provided by several different types of libraries. Service to the heterogeneous public is available through many *public* library systems; the academic community is served by *college and university* libraries; and elementary and secondary students by *school* libraries. Other groups with specialized interests obtain library services from a wide variety of *special* libraries.

Until 25-30 years ago these four major types of libraries were quite sufficient to satisfy the information needs of the great majority of users; but since 1940 there have been greater advances in education, research, science, and technology than in any previous period in our history. The output of recorded information has never been greater – a fact well known to librarians. The many factors which affect our society have become so interrelated and entwined that the need for new ways to disseminate recorded information has become increasingly apparent. It is also a well-known fact that the needs for information are so diverse and complex that no single institution, such as the library, can carry the entire burden. As a result, a number of new information agencies have come into existence, and others have been expanded. Collectively these agencies provide a wide range of services that libraries usually do not offer. They are identified by such names as specialized information centers, referral centers, distribution centers,

clearinghouses, and abstracting services.

The point to be stressed at this time is that the library cannot exist in a vacuum as an isolated institution. This is a truism of the past, but to remain viable and strong it is a "must" of the future.

Those of us interested in the progress of information science visualize the library as a major component in a large network system dedicated to the processing and transfer of information of all kinds.

Each information agency will complement, not duplicate, the work of others so that their combined efforts will more nearly satisfy the users' needs for information, whatever they may be at any given time.

Much of the library research now in progress is directed toward determining the optimum role of libraries in national information systems. Other information agencies are also attempting to define their roles. Each of these efforts should be directed toward a complex iriformation network that will be evolving in the years ahead.

One result of advances in scientific research and technology that is of particular interest to information systems is the electronic digital computer, a major phenomenon of the last half of the 20th Century. Since 1953 when computers were first available for commercial use, they have had a remarkable social and economic impact in countries throughout the world. They have changed business and industrial procedures; they have become an indispensable tool of research. They are involved ín communication processes and in extending the minds of men. Computers have much to contribute to the operation and management of libraries and to the processing and transfer of information. We have just begun to appreciate their vast capabilities.

Today, organizations that handle information use computers and related equipment for two main types of activity — "document" processing and "content" processing. In general document processing has been the principal concern of libraries, and content processing the principal concern of information facilities outside the library.

Although both are essential to the development and progress of the communication and transfer of information, the development of information networks, and the discipline of information science, the subject is too broad to be discussed in one paper. Therefore, discussion in this paper is limited to the activities of libraries and the responsibilities of librarians.

For the most part, libraries use computers and other data processing equipment to assist in the processing and control of the physical items that comprise the library collection. Although we are accustomed to referring to these items as "documents," the term now is not completely accurate. A "document," in the strictest sense, means a record printed or written on paper, Today's library collections include the usual printed materiais such as books, journals, newspapers, and reports; but they also include an increasing number of non-print materials such as recordings, audiovisual materiais, films and film strips, microrecords, and even machine-readable data bases recorded on magnetic tapes and other electronic data processing media. Libraries are using computers and related data processing equipment to perform tasks and maintain records in connection with acquisitions, bibliographic control, maintenance of the collection, circulation., reference services, interlibrary loans, and telecommunications. This group of activities is known as "Library Automation," "Automation in Libraries," "Mechanization of Libraries," and "Data Processing in Libraries."

The first use of data processing equipment in a library in the United States was in 1936. From then until about 1960, a number of libraries used punched card equipment and paper-tape typewriters (for example, Flexowriter) for single tasks such as ordering, accounting, preparation of catalog cards, book catalogs and book lists, and circulation control. Manual methods in some libraries were slow and costly. They were not adequate to handle the increased volume of materials and the greater demands for improved and expanded library services. However, punched card equipment and paper-tape typewriters are limited in what they can do so libraries were limited in how they could use these machines. Until libraries began to have access to computers (about 1960), it was almost impossible to integrate applications within one library system or exchange machine-readable information with other libraries.

The use of first-generation computers (1953-1958) was limited to goverument agencies and very large corporations and, therefore, had **little** effect on library operations. The introduction of second-generation computers (1958-1962) marks the period during which computers became a meaningful componet of life in the United States. The development of transistors and other lectronic improvements enabled manufacturers to make the equipment faster, smaller in size, less costly, and far more reliable. Since computers were becoming available in many colleges and universities, commercial and industrial enterprises, and most government agencies, many libraries had access to this equipment and began to plan in terms of system development, integrated systems, and networks.

The MARC (machine-readable cataloging) project, which began at the Library of Congress in 1965, is the largest single library automation activity with the greatest impact on libraries in the United States, United Kingdom, and Europe. In 1969 the Library of Congress began weekly distribution of

MARC records in machine-readable form to sub-scribers in the United States and abroad. These records on magnetic tape are the bibliographic entries of English language monographs (books) cataloged at the Library of Congress during the previous week. Early in 1973 the Distribution Service will include French-language monographs, with other languages to be added later. In addition, MARC formats for Serials, Maps, and Films have been published.

A major breakthrough in standardization of biblio-graphic records occurred in 1971; the American National Standards Institute approved the MARC format for the interchange of bibliographic in-formation on magnetic tape. Another milestone occurred in 1972 when the International Standards Organization (ISO) also adopted the MARC format. One of the most advanced and successful operations in the United States that incorporates the use of MARC tapes is OCLC (Ohio College Library Center) of which my own university is a member. OCLC is a non-profit corporation with a large time-sharing computer system serving 50 member colleges and universities in the State of Ohio plus a number of other libraries and library systems throughout the country. The data base of OCLC consists of the bibliographic records (catalog) from the MARC tapes plus original bibliographic records entered by member institutions. Each library is linked to the computer, located in Columbus, Ohio, by one or more cathode ray tube terminals. A cathode ray tube (CRT) terminal is a television-like screen plus a typewriter keyboard. This link enables each member library to receive and send catalog information. For each book to be cataloged, the cataloger queries the computer via the CRT to learn whether the title is already in the machine-readable data base. If it is in the system, the cataloging information is accepted; and the library adds its code to the list of libraries holding that book. Thus, a union catalog is developing as a by-product of cataloging. Each library has an extensive set of "profiles" stored in the computer for the production of catalog cards. These profiles include details about arrangement of bibliographic entries on the cards, number of cards to be produced, in what catalogs the cards will be filed, etc. On receipt of the order to produce cards according to the profile required for a particular title, OCLC then computer-produces the required card sets in batch process after the on-line system is shut down at 7 p.m. These cards are sorted for filing purposes, packaged, and sent by surface mail to the library. Deliveries are usually made within two or three days. In the event that the title does not appear in the OCLC data base, the library inputs original cataloging into the OCLC system, and the cards are ordered and produced as described above.

Within the next year or two serial titles will be added to the data base, and circulation control will become a part of the system. In addition to the examples mentioned above, hundreds of libraries are engaged in some aspect of library automation. These activities range from limited applications using punched cards and paper-tape typewriters to very advanced on-line integrated computer systems and networks involving many libraries.

Library automation continues to be one of the most exciting but controversial topics in modern librar-ianship. The term itself, though widely used, appears to have no authoritative definition. On the surface the use of computers in libraries may seem simple and straightforward. In practice it is one of the *most difficult but potentially rewarding* endeavors that libraries and other information agencies have ever attempted. Over the years there have been both successes and failures and a multitude of problems. Most of the problems and many of the failures can be directly attributed to the nature of libraries, the nature of computer technology, and poor communication among those involved.

Libraries are very complex institutions. The materials they handle and the operations they perform are varied and complicated. Present-day library collections consist of a wide assortment of both print and non-print materials. These vary widely in form and contents, and the records required for their bibliographic control must reflect these wide differences. It is generally recognized that library records are some of the most complex in existence. They vary in length and must be expressed in alphabetic characters. The structure of some, such as a catalog record, almost defies standardization. Computers, on the other hand, operate most efficiently in time and cost with numeric data and fixed-length records. They were originally intended for mathematical calculations and later recognized also as processors of data. Standardization is an inherent characteristic. Library records, therefore, make some rather unusual demands on computers; only a project of international proportion, such as MARC, could break this deadlock. In spite of these compatibility problems, computers have proved capable of handling library operations; and the challenge of those working in the field of library automation is to bring computer technology and the requirements of library functions into an efficient and useful working relationship. We are beyond the stage where the use of computers in libraries is just a passing fancy or an experiment; it is now a reality. Successful use of computer technology requires a precisencss in planning, development, analysis, synthesis, and organization not often found in libraries. Successful management requires a new kind of interaction and interrelationship of people,

machines, and materials. Development costs are always high, and libraries are always constrained by limited budgets. These are considerations that must be recognized.

Serious problems have occurred because of lack of satisfactory communication between librarians and computer personnel. This polarity will continue to exist until more librarians become more familiar with computer technology. It is said that librarians can be trained to understand computers more easily than computer people can learn librarianship. In general the statement seems to be true although there are outstanding examples of computer people who have become experts in library techniques and operations.

Nevertheless, the need for librarians and information scientists to continue to control the future of their libraries and information systems cannot be overemphasized. Librarians and information scientists must determine their own professional involvement, and they must have the knowledge to decide the role that computers and other kinds of technology will have in the future. A successful information system must use any means available to improve methods and techniques that result in better service to users; but the adoption of any equipment or technique that does not ultimately result in improved service is questionable.

In the United States the trend toward sharing of resources andnetwork development seems the most practical way at this time to meet the information needs of the most users. Computers and telecommunications provide the technology necessary to make large-scale cooperative projects both functionally and economically feasible.

Computers offer new ways of doing things, some completely different from former methods. Librarians now have more choices from which to select, but more choices require more decisions. Librarians and information scientists can make judicious decisions only when they have sufficient knowledge and experience to view the problems and operations in an objective, independent, and enlightened manner.

Librarians and information scientists of Brazil already recognize the potential of computer technology and the "need to know." Data processing equipment such as punched card machines and paper-tape typewriters are used daily in some libraries and information centers for internai processing. To a lesser extent computers are also used to produce machine-readable data bases and computer-printed bibliographic products, but the trend is growing and is now reflected in educational programs.

In June 1970, an advanced course in Information Science was introduced at the Instituto Brasileiro de Bibliografia e Documentação in Rio de Janeiro. This one-year program was the first in Brazil to lead to the Master's degree in Information Science (Mestre em Biblioteconomia e Documentação),

granted by the Universidade Federal do Rio de Janeiro. It has been my pleasure and good fortune to participate in this program each of the three years it has been in existence. I believe that several aspects of this course of study deserve mention as indicative of innovation and far-sighted planning in Brazilian librarianship. Although all students thus far have library degrees, the Master's program recognizes the much broader concept of Information Science, as reflected in the course title "Curso de Pós-Graduação em Ciência da Informação." Furthermore, the curriculum includes topics such as "Computer Programming," "Set Theory," "Information Retrieval", "Automation of Library Processes." No doubt questions have been raised about the need for this kind of information when most Brazilian libraries are of moderate size and there is no shortage of library personnel for existing jobs. Research is not yet overwhelming in quantity, and present methods for handling library materials seem adequate at this time. Why should information of this type be required?

I have attempted to answer these doubts and questions in a general way. For Brazil, in particular, the country's rapid development offers some clues. Brazil has tremendous natural and human resources and in 1971 enjoyed the largest (11.3%) economic growth of any country in the world. It is expanding its educational system, especially at higher levels. It is working toward a better and more productive life for its citizens. It is pushing back frontiers and expanding its international trade. It is already using and benefiting from 20th Century science and technology, such as radio, television, telecommunications, air transportation, atomic energy, and of course electronic computers.

As research and education advance, the need for expanded information services will become even greater. No one knows exactly what the structure of information systems will be in the decades ahead. Evidence suggests that the libraries and information centers within Brazil may become involved in a national network system and ultimately in an international system.

Today's students will be tomorrow's librarians — information scientists who will take their positions of responsibility in libraries and other information agencies. These individuais must be prepared to understand and meet the challenges that will confront them during their professional careers. They must have sufficient knowledge and wisdom to be selective and to incorporate the best of new technologies and techniques, whatever they may be at any given time, in ways which will improve their ability to serve the users of recorded information. Brazil's librarians — information scientists seem to be aware of these educational needs and the importance of the management and control of recorded information.

RESUMO

A Biblioteca, como uma instituição social, evoluiu do conceito de servir apenas a uma elite para atingir usuários de todas as idades, todos os níveis econômicos e todos os meios sociais. As pesquisas biblioteconômicas atualmente são orientadas para o papel das bibliotecas nos sistemas nacionais de informação.

Computadores e equipamentos correlates são utilizados em dois grupos principais de atividades de informação: processamento de "documentos" e processamento de "conteúdo". A partir da década de 60 as bibliotecas americanas, dispondo de acesso ao computador, começaram a planejar em termos de desenvolvimento de sistemas integrados e redes de informação.

Um dos mais modernos e bem sucedidos projetos nos Estados Estados Unidos é o OCLC (Ohio College Library Center) que incorpora o uso., das fitas magnéticas do Projeto MARC. Bibliotecários e cientistas da informação no Brasil já reconheceram o potencial da tecnologia do computador e a "necessidade de saber". O primeiro curso de Pós-Graduação em nível de Mestrado no Brasil foi iniciado em 1970 no Instituto Brasileiro de Bibliografia e Documentação, em convênio com a Universidade Federal do Rio de Janeiro. Vários aspectos deste Curso indicam inovações e planejamento com vistas ao futuro da Biblioteconomia Brasileira. (Recebido para publicação em 30 de novembro de 1972).