1962: Research on Concepts and Problems of Libraries of the Future

In its largest award in fiscal year 1962, CLR granted $162,258 to Bolt Beranek and Newman Inc. for Research on Concepts and Problems of Libraries of the Future. With the proliferation of information in the 20th century, traditional methods of information management had become inadequate. More work was needed in technical storage and retrieval to make collections useful. The quest for a "push-button library" was under way. The research project, under the direction of J. C. R. Licklider, looked at the functions that needed to be fulfilled by library systems; possible technologies to support their operations; an analysis of aims, methods, and problems in information storage and retrieval; and specific problems of man-machine communication and artificial intelligence.

Relatedly, that same year, with support from CLR, the American Library Association staged an exhibit, "Library 21" at the Century 21 Exposition in Seattle. The exhibit demonstrated the possibilities for a push-button library. CLR's annual report described the reactions as "interesting and informing":

The traditionalists, as we expected, resented the intrusion of machines into a library exhibit as a negation of librarianship. The mechanists, on the other hand, felt the results of an investment even of this size to be trivial. The visiting public, estimated at over a half a million, seemed in general to be more interested in microfilming machines ... than in the robots. These reactions all suggest that the road to the "push-button" library will be long, slow and expensive, and that the book is in no foreseeable danger of displacement. Efforts to improve the book-based techniques of library work are, in this view, wholly justified. (p. 10)

The description at right is taken from the 6th annual report of the Council on Library Resources, Inc., for the period ending June 30, 1962, pp. 7–11.

The Council on Library Resources

THE SIXTH YEAR

The methods employed by libraries from earliest times for organizing their collections have been basically inventorial in character. But for some time it has been increasingly clear to some observers that these methods are inadequate to the purpose intended — that of making the collections useful.

"Even the modern great library," said Dr. Vannevar Bush in 1945, "is not generally consulted; it is nibbled at by a few." The reason for this, he suggested, was that "The summation of human experience is being expanded at a prodigious rate, and the means we use for threading our way through the consequent maze to the momentarily important item is the same as was used in the days of square-rigged ships." But, he added, "The world has arrived at an age of cheap complex devices of great reliability; and something is bound to come of it"; and he suggested a number of applications of such devices to what has since come to be known as the "information problem."[1]

From these and similar observations has come the quest for the "push-button library," and much effort and intelligence has been devoted to it. Progress has been slow but has taken place, and there are numerous operating systems in which "push-button" machine selection has replaced manual selection; e.g., with respect to libraries of engineering drawings, or of reports of chemical research. Even for the more traditional methods of library work, automata have speeded up the making of indexes and concordances. Meanwhile, copious research is under way looking to the development of devices for reading printed text; for converting oral to graphic systems of communication and vice versa, for indexing, abstracting and interlingual translation; for spatial compression of records; and for improved methods of classification and indexing.

Few of these developments have as yet affected any but clerical operations in general libraries. For one thing, except for certain special applications such as those just mentioned,

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[1] Vannevar Bush: As We May Think. *Atlantic Monthly* 176: 101-108. July 1945.
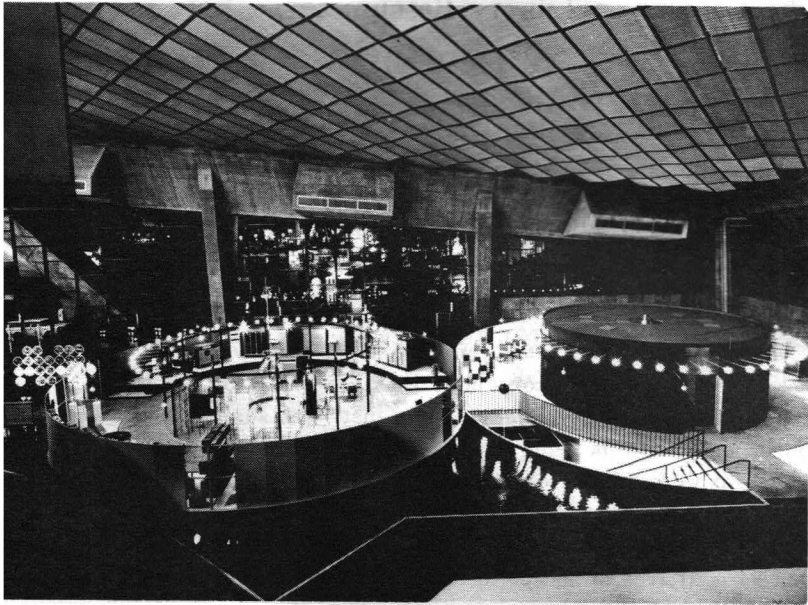
LIBRARY 21 — *Above:* Overall view of American Library Association exhibit at the Century 21 Exposition, Seattle. The left circle includes the Automated Library Center, Ready Reference Center and Adult Reading Area. The right circle includes the Learning and Resources Center, Xerox Theater, Radio Corporation of America and National Cash Register exhibits, and stairway leading to the Children's World below. The circles are framed by a reflecting pool.

Below: Secretary of State Dean Rusk, center, examines answers to a choice of questions printed out by an information storage and retrieval system featured by a solid-state computer.

the service provided by the new mechanisms cannot yet compete either in cost or convenience with the traditional methods; for the purposes which most libraries serve, the book still provides the least expensive and most convenient form of storage of information, and the card catalog and the book-index the most flexible and effective instruments for reaching it. For another, even were techniques and devices developed which would enable a mechanized service to rival or even to exceed the satisfactoriness of traditional methods, the new mechanisms would require an expensive conversion of records to machine-readable form — typically microtext, punched cards or computer tape. It may be foreseen that records will eventually be initially published in such forms (and indeed, there are harbingers of this); but, meanwhile, libraries will necessarily be slow to convert.

The Council's program includes support of a number of projects of research and development looking to the application of the "advanced data processing" mechanisms to library work. As a result of one of these, a device has been constructed which stores microimages at a density rate of a million per cubic foot and locates any desired image and provides a re-enlargement ("hard copy") of it in less than a second. This is an outstanding engineering achievement, yet although the device will undoubtedly find special applications for which its speed and compression of storage commend it, it is for many applications inferior technologically as well as economically to its equivalent in books. In other projects the Council has supported general surveys of the possibilities of mechanization of university and other research libraries, an investigation of machine indexing, and an inquiry into the possibilities of machine searching of statutory law.

During the past year occasion offered opportunity for a public demonstration of elements of the progress toward the "pushbutton" library. The American Library Association was invited to participate in the Century 21 Exposition at Seattle, Washington, April - October 1962, with an exhibit having emphasis on the "library of the future." This presented an opportunity not only for demonstrating the traditional patterns of excellent library service, but also for showing some of the realities behind the talk of "push-button libraries." Accordingly, a grant by the Council to the Association made possible the necessary planning; and cooperation was secured from

industry and others to the extent that the resultant exhibit represented a total investment of more than $2 million.

Reactions to the exhibit were interesting and informing. The traditionalists, as was expected, resented the intrusion of machines into a library exhibit as the negation of librarianship. The mechanists, on the other hand, felt the results of an investment of even this size to be trivial. The visiting public, estimated at over half a million, seemed in general to be more interested in microfilm reading machines (devices long established in research libraries) than in the robots. These reactions all suggest that the road to the "push-button" library will be long, slow and expensive, and that the book is in no foreseeable danger of displacement. Efforts to improve the book-based techniques of library work are, in this view, wholly justified.

Concepts and Problems of Libraries of the Future. In making a new grant to the Council for a period commencing with the year just past, the Trustees of the Ford Foundation made provision for the Council to "concentrate its work in the field of technical storage and retrieval of information through the creation of a laboratory or center involving the activities of specialized personnel." A careful survey was made of the possibilities. These included the equipping and staffing by the Council of a laboratory of its own, the development of a new facility in cooperation with some research institution, or an arrangement with an organization already possessing basic facilities in equipment and staff.

Similarly, there were a number of alternative possibilities for the program of such a center. Should it, assuming the persistence of certain patterns and conditions of library work, concentrate on the development of particular devices of great promise as viewed against the persisting framework? Or, at the other extreme, should it abandon all such assumptions and engage instead in a fundamental study of the processes of cognition which might suggest a totally new set of patterns and conditions? In exploring these questions the Council sought advice from a number of persons who have thought deeply on this subject.[2]

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[2] Members of the Committee on the Laboratory are listed on page 5. Among others to whom the Council is most indebted in this exploration are Dr. William O. Baker, Dr. Lloyd V. Berkner, Dr. Richard H. Bolt, Dr. Caryl P. Haskins, Dr. Edwin H. Land, Dr. Anthony G. Oettinger, Dr. Emanuel R. Piore, Dr. Earl P. Stevenson and Dr. Warren Weaver.

In the event, the Council contracted, late in 1961, with the firm of Bolt Beranek and Newman, Inc., of Cambridge, Massachusetts, for exploratory "research on concepts and problems of libraries of the future," to be directed, in consultation with an advisory committee, by Dr. J. C. R. Licklider, formerly associate professor of psychology and communication at the Massachusetts Institute of Technology, and active in research in the processing, communication and display of information. The contemplated research neither assumes the persistence of present patterns of library work, nor does it commence with the cognitive process. Rather, it assumes merely that information must be stored and organized, that devices will be required for this purpose, and that human beings must interact with these devices, and that improvements can be effected in all these areas.

The first year's work accordingly proposed to develop the agenda for further research through a number of preliminary inquiries, including the preparation of a quantitative, functional description of libraries as they now operate; formulation of a statement of the functions that should be fulfilled by library systems; the examination of related sciences and technologies for their potential support of library operations; an analysis of aims, methods and problems in information storage and retrieval and in memory organization; and the performance of research on specific problems of man-machine communication and "artificial intelligence." It is proposed to publish the results of these studies as completed.

Summary of Activity in 1962. Forty grants, contracts and other allocations, representing a somewhat larger number of projects (for example, a number of separate projects were provided for under the allocation to the Library Technology Project) were made by the Council during 1962. These totalled $961,128. Twenty-five of the allocations were for new projects; thirteen were for extensions or renewals of prior undertakings.

The following pages describe, in the categorization which has proved useful in previous reports, the projects assisted during the year as well as the results of projects completed.

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President