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The Library as an Information Broker

Since the late 1960s, research oriented to broad, complex issues has given rise to information brokers, who package, validate, and evaluate data for clients on a cost-effective basis. They employ all forms of technology—from the telephone to on-line searching. Such technology is now entering the home through home computers and video. Librarians should familiarize themselves with these new trends, benefit from them through their use, and seek for the development of a national information policy.

WE ARE ALL painfully aware that prices for library materials, labor, and the construction and maintenance of physical facilities are rising dramatically. It isn't necessary to wait for an annual summary issue of *Publishers Weekly* or *Library Journal* to confirm these trends because library administrators are coping with the fiscal and statistical evidence on a daily basis. There are two other trends that are less obvious:

1. The importance of information in our society is increasing.

— More than 50 percent of the working population are involved in information handling in such information industries as education, broadcasting, telephone, publishing, libraries, and the postal service.[1]

— The information industries represent expenditures of one-third of a trillion dollars annually.

2. The users of information are approaching their needs differently from before. A recent Arthur D. Little, Inc., study for the National Science Foundation described the changes under the catchy title *Passing the Threshold into the Information Age.*[2] It portrays three information eras: Era I, that of discipline-oriented research; Era II, that of mission-oriented research; and Era III, that of problem-oriented research.

THREE ERAS

Era I was dominant through World War II and remains very significant even today, especially in academic institutions. The attitude might be described as knowledge for knowledge's sake.

Era I information is customarily disseminated through books, journals, and professional meetings. The "invisible college" is also a significant factor. It is the exchange among a limited number of persons in a field through conversation, correspondence, and the exchange of preprints. It is possible because the producers and users of information are usually trained in the same discipline.

Information access is often subsidized both at the production end and at the user end, the latter through libraries.

The development of Era II was promoted by the grantsmanship of mission-oriented federal agencies such as NASA and AEC, according to the Arthur D. Little study. It involves the organization of vast resources to accomplish a fairly well defined task.

Era II research involves information from a variety of related disciplines. The service agencies of Era I, such as libraries, are used, but additional sources are tapped. Private systems for repackaging information are characteristic of Era II. Many of these were developed in-house with research grant funds, while others were begun as speculative commercial ventures. Over three thousand indexing and abstracting services are a major development of Era II.

The "invisible college" is less of a factor in Era II because the producers of information are often in a different discipline from that of the user.

Era III emerged in the late 1960s as soci-

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ety began to grapple with broad, complex issues such as energy, environment, and health. Topics such as these require the use of information from many varied disciplines such as law, economics, engineering, and sociology.

More than ever, decisions must be reached quickly and they must be of high quality. That requires suitable information in usable form.

The Arthur D. Little study for NSF characterized many end users as limited in their skills to cope with information flow and suggested that information can best flow through various expert intermediaries, consultants, and secondary information channels.

The view is justified by the fact that producers and users of information are quite separated. There is no "invisible college."

Users often don't know the vocabularies, biases, and methods of various disciplines. Conflicting information is common. Users need to have information repackaged. They often need to have it validated and evaluated.

Newsletters, data-base publications, and on-line services are common to Era III. On-line services alone now may serve as many as five thousand customers with more than a hundred data bases.

The Information Brokers

Information brokers are a phenomenon of Era III. They are individuals or firms who search out and organize information for users. The principal concern is to be of value to the client whether within the same parent organization or outside it. They locate and interpret information in light of the problem the client seeks to solve.

Until the late 1960s, according to the study, the distributors of information have generally tended to be within an organization and have operated almost as "servants." In contrast, information brokers of the 1970s are using a business venture approach, billing even within a parent organization.

There are, of course, counterparts in academe and government. The NASA-sponsored information access centers in universities are an example.

Brokers may provide highly specific information. They may or may not validate or evaluate the information. The trend appears to be toward validation (by information search services) and evaluation (by consulting services).

Brokers may undertake broad research questions. This is often sought by clients to overcome the lack of standardization of access mechanisms—vocabularies, index terms, formats, computer file structures, languages, protocols, etc.

Another reason for validation and evaluation is that much conflicting information is found when one is dealing with problem-oriented research.

There are at least seventy-five for-profit information search or brokerage firms in the United States. Information brokerage costs from twenty dollars to seventy-five dollars per hour, with forty dollars the most common figure quoted by persons contacted recently. The complexity of the research accounts for the range, rather than arbitrary pricing practices.

Who is buying such services? Not those the pioneers in the field first approached. The founders of Warner-Eddison in Cambridge, a firm of information brokers, thought they would be serving small companies without libraries, but they have discovered that large companies and government agencies are the principal clients, not only for searching but also for information management—including the creation of special subject headings and indexes to meet special needs.

Other information brokers have reported that they serve marketing departments of corporations or market research organizations. The Congressional Research Service has developed into an information broker for Congress. Citizens' groups and planning organizations buy such services, as do the regulatory agencies of state and national government.

The users have the resources. There are undoubtedly many more who would use these services were the agencies of Era I or Era II to offer them without charge. The unanswered question is, Does it take more money to offer Era III services or is it a matter of allocation of resources? A closer examination of the actual practices of information brokers is warranted. I have visited several and have the following impressions:

Techniques of the Broker

The emphasis on information as a commodity with monetary value and the need to satisfy clients with cost-effective service make the information brokers very conscious of the costs of accessing information and alert to alternative ways of gathering information.

I was struck by the emphasis on the use of the telephone to gather or validate information. I was told repeatedly that experts in a field are flattered to be sought out for help. When I raised the objection that widespread reliance on this technique of information gathering would jeopardize its success, the response was, "Then we'll pay them for their response." There is no question but that timely information can best be gotten in this way—and at a very low price.

Use of Technology

The use of technology is widespread, with the computer terminal for access to on-line data bases almost universal. When I inquired about cost effectiveness, several referred me to Dennis R. Elchesen's recent article: "Cost-Effectiveness Comparison of Manual and On-Line Retrospective Bibliographic Searching."[3] Let me summarize from that article.

On-Line Searching

Over one million on-line retrospective searches were performed in the United States and Canada in 1977, according to Martha Williams.[4] Over eight hundred organizations now use such searching, of whom six hundred use both manual and on-line. (On-line vendors estimate over 2.5 million searches in 1978.)

The current study employs cost-effectiveness analysis—to learn which search mode is generally faster, less costly, and more effective in scientific and technical organizations.

The study was to find which search mode was more effective in handling broad queries, narrow queries, phrase searches, free-text searches, and searches that aim at high recall or high precision.

The study attempted to account for all components of the total cost: labor, information, reproduction, equipment, space, and telecommunications.

The searches were done by members of the Lawrence Livermore Laboratory Research Information Group at the University of California, Livermore. A supervisor selected manual and on-line searchers of comparable subject expertise and searching experience and gave each an identical description of the search topic. The supervisor also chose the information sources to be used. Forty topics were selected.

The findings:

On the average, five on-line searches may be conducted in the same amount of time required to perform a single manual search. For both search modes, the most time-consuming task was searching itself.

The mean composite cost of a manual search was somewhat higher than the corresponding on-line search.

On-line searching becomes more economical than manual searching as searcher skill increases.

For manual searches the most expensive areas were searcher labor and information. For the on-line searching the most costly component was information, with the cost of searcher labor and reproduction divided almost equally.

The cost of on-line retrospective searching is decreasing.

On the average, the on-line searches retrieved more citations per search than the manual searches, although wide variations were observed among the data bases.

For manual searches, all citations retrieved were considered relevant, since the searchers made their own relevancy judgments during the searches. In the case of on-line searches, relevancy was usually determined after receipt of the printout—hence a relevance rate of 84 percent.

The average cost per relevant citation retrieved manually was eighty-six cents, compared to sixty-five cents for the on-line mode.

On-line searching is generally more effective than manual searching for both broad and narrow topics. There are some other studies in this area with contradictory results, however.

Certain extremely general or extremely specific searches are best supplemented by the use of printed tools and personal contacts.

The Future for On-Line Systems

The time and cost advantages now en-

joyed by on-line system users are likely to grow in the future. Recent studies by Arthur D. Little, Inc., indicate that by 1983 costs for central processing will be less than half of today's, communication costs will have decreased by two-thirds, and the cost of an intelligent CRT terminal will have decreased by 80 percent. They further predict that in the 1980s it will be cheaper to store information in random access memory than to print, distribute, and store hard-copy publications.

Technology in the Home

There also appears to be a high level of awareness that home computers and home video may change the way people will access information in the future.

Entertainment technology is a higher priority for the television industry at this time than information technology, but it is reasonable to assume that home computers and home video will be adapted to other than entertainment applications. Makers of home computers have already augmented their offerings of games with programs for home bookkeeping and the teaching of mathematics and spelling to children. Videocassette rentals of educational materials are increasing rapidly.

The mass market for entertainment can support home systems costing thousands of dollars and software that costs forty dollars to four hundred dollars per hour of programming. The information market will probably not mature until a moderately priced keyboard terminal can be attached to any television set and videocassette is augmented with the lower-cost videodisc.

Videodisc technology is of particularly great interest to those with whom I spoke even though the first marketing is not to be undertaken until December 1978. At that time North American Philips and MCA are to introduce a player and a catalog of more than two hundred entertainment programs. The cost of producing a single disc when several hundred thousands are stamped from a master is less than $1.50. The total production cost is less than $6.00 when at least twenty-five hundred copies are made. The cost of producing fifty copies would be less than $40.00 each, still much less than the least expensive videotape.

More than fifty-four thousand images can be stored on a single side of a disc. The use of both sides gives one hundred eight thousand still images or one hour of playing time for a program taken from film or videotape. Slides, photographs, and the printed page can also be stored on videodisc.

MCA has already entered the industrial market with Universal Pioneer of Japan. The MCA 7280 Video Disk Viewer is already being sold selectively. The CIA has bought at least thirty units and has acquired pictorial data on disc through MCA.

It is clear that it is possible to produce entire libraries at very small cost, thus further adding to the resources of the information broker. The greatest hurdle is probably that of copyright. Several of those with whom I spoke are convinced that payment for use, rather than payment for acquisition of information, is the key to the resolution of this issue.

Risk and Uncertainty

There seems to be a willingness to deal with risks. The field is still small, and the presence of so many independent-minded entrepreneurial types may be only a temporary phenomenon.

I got into a very interesting conversation with one person about the difference between uncertainty and risk. We agreed that uncertainty is the situation in which there are many possible outcomes, but we neither know them all, nor do we know the probabilities of the outcomes of which we are aware. Risk, on the other hand, is measurable uncertainty. We know the possible outcomes because we have researched them and we make a careful estimate of the probabilities of each. We just don't know what will happen in a specific case. It is the willingness to move forward in the face of this risk that is a key to the success of the information brokers to whom I talked.

Allow me a tangent: I think most of us don't take as many risks as we might, because, as R. Kent Wood says, "In our society we are conditioned to avoid more than casual mention of failure, let alone set about to analyze it."[5] In reality we should analyze possible modes of failure in our systems for the very positive reason of increasing the probability of success.

A Response by Librarians

Information brokers have developed techniques and attitudes to meet the needs of the Era III user. They have created a new growth industry. I believe librarians can and should increase their awareness of future trends by visiting one or more such organizations in their areas.

I believe libraries should move away from a book-and-journal orientation to an information-needs-of-users orientation, with information stored and accessed economically using the new technologies.

I am not saying they should become information brokers for all of their users, because there are Era I, Era II, and Era III users. But the Era III users should be served. I am painfully aware that the addition of new demands does not mean a diminution of the old demands. The old demands remain and continue to grow. One of the advantages enjoyed by the for-profit information brokers I have described is that they can select a segment of the market at which to direct their services. Not many academic libraries have that option.

Librarians can't accomplish major changes in their respective libraries by just reallocating resources. There are too many faculty and staff who will seek to protect the library materials and personnel budgets against any reallocation to something untried. Publishers may protect their interests in the traditional methods of book and journal publishing. Major federal funding agencies and foundations are committed to basic and applied research and opposed to funding research applications, even though the diffusion rate of sponsored research is one of our major problems.

What is needed is a national information policy to increase awareness, provide forums for different sectors of the information system to come together, and stimulate a reshaping of foundation and federal agency attitudes about the funding of research applications.

Librarians should seek the development of such a policy by approaching the legislative and executive branches of government through their professional organizations.

Can librarians do this alone? No. There are too many vested interests, and the various components of the information industry are too interdependent. The suggestion of a national library board advanced in the recently published Council on Library Resources technical development plan for a national periodicals center has already drawn the ire of the publishing and information industries.

Can information brokers do it alone? No, and they don't think they can. They have already decided that what is needed is a national information policy. In May 1977 the board of directors of the Information Industry Association decided to draw up a position paper setting forth the industry's viewpoint on such a national information policy.

Can a single national agency do it? No. The National Science Foundation, an agency that funded 90 percent of the federally supported information science research in this country in 1976, has had such a recommendation from task forces, consultants, and staff for more than two decades, but no such policy statement has been forthcoming.

What is needed is a joint planning effort among the various components. Information transfer has been a low priority for national attention because the components of the system have been fragmented. Conflict resolution can best be undertaken with the various interests around the same table. We all exist to serve the end users of information.

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