



Changes in Information Delivery Since 1960 in Health Science Libraries

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This paper focuses on current concepts of what health science libraries in the United States should provide their users and on factors which have played a major role in the development of these concepts during the last dozen years. User needs, primarily as interpreted by health science educators, administrators, legislators and librarians, have shaped the concepts and the priorities. Unfortunately, thus far there are no satisfactory methodologies for testing the validity of the interpretations other than simple counts of consumption and a limited number of evaluation studies, but it is reasonable to assume that increasing rates of consumption do indicate that the new directions of services are indeed in line with needs. Potential users have themselves changed vastly in number and kind since 1960 as the health field has burgeoned into one of the largest industries in the nation.

Types of health science libraries and developing trends in them through the early 1960s, have already been identified by Langner in this issue. Casualties and mergers have continued since then in the medical society library area, while libraries serving a combination of schools have multiplied as academic medical center complexes have spread. New in the 1960s were the library-based information analysis center, the formalized regional medical library network and the great impetus in the development of community hospital medical libraries. A detailed account of health science libraries by type in the 1960s is given in a very useful recent survey edited by Crawford.¹ In the present paper the concern is not so much with types of libraries *per se* as with health science libraries in general and with interrelations within the genre. Similarly, it is not so much the specific mechanisms by which user needs

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are being met, but the broad provisions for them that this paper discusses.

CURRENT CONCEPTS OF HEALTH SCIENCE LIBRARY
SERVICE: ORIGINS AND BACKGROUND

Health science librarians are likely to identify closely with users of their libraries because of the human and humanitarian appeal of the subject area and the generally dynamic environment of the institutions in which health science libraries operate. Thus it is not surprising that, as Langner has pointed out, reference, bibliographical and interlibrary loan services have had special emphasis in health science libraries, and that some of them developed fairly sophisticated services such as SDI at an early date. On the other hand, there is conspicuous inequality in service among health science libraries, especially those in the hospital group because so many are in nonteaching hospitals where accrediting standards for libraries are not specific and thus subject to wide variation in implementation. Standards are a separate subject for which the reader is referred to discussions in "Guidelines for Medical School Libraries,"² a more recent study on user services in academic health science libraries,³ and *Standards for Library Services in Health Care Institutions*,⁴ but obviously standards have a direct effect on minimum services offered users. The effort to improve "token only" libraries in a large number of nonteaching hospitals has been a significant part of the drive to equalize access to health sciences information during the latter part of the period under consideration.

The equalizing of access to information has probably had more emphasis in health science libraries than anywhere else in the library world, but before considering this problem it is necessary to turn first to the basic question of information control as it affected health science libraries in the early 1960s. Despite their service orientation, even the most favored were struggling to find funds to cover the skyrocketing number of publications and for space in which to shelve what they acquired. Price advances, while not the grim problem of today, were serious, caused not only by rising inflation but also by an increase in the number of pages per unit publication, especially in the serial literature. A sobering account of the condition of most medical school libraries at this time is given in a report prepared for the NLM in 1963.⁵ The incredible proliferation in the printing of conference proceedings, consequential and inconsequential, had started; the report literature was beginning to have a little more importance for the biomedical field;

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apparatus for control of the information flood were becoming more numerous, although not more adequate; and libraries as institutions for solving the information problem had been given short shrift in several high level national reports. Information evaluation or analysis centers were being proclaimed *the* panacea and scientists were exhorted to participate in them or at least in some way to take more responsibility for ordered, effective communication of the results of their research.

The literature is replete with discussion of the information explosion, including debate on whether it exists or is merely an inexact term for describing a long-continuing exponential expansion in the number of scientists and the amount of information generated by them. Some students of the science of science predict a flattening of the growth curve while others see increased escalation ahead.⁶ Whatever the phenomenon is labeled and whatever its growth characteristics may prove to be, there is no question of its explosive impact on all information agencies dealing with the sciences. In the health sciences area the impact has been magnified by the scattered nature of the literature of many of its subfields and by the interdisciplinary developments in many more. New serials result from both the splintering of fields into new specializations developed through biomedical research and from combinations with the physical sciences at one end, and the behavioral and social sciences at the other.⁷ Consider, for example, these recent titles, *Chemical Senses and Flavor*, *Journal of Clinical Ultrasound*, *Human Ecology*, *Journal of Biosocial Science*, and *Studies of the Hastings Center of the Institute of Society, Ethics and the Life Sciences*.

The first wide alarm, outside libraries, over the control and transfer of information crystallized with the launching of Sputnik I in 1957. Individual voices had been raised here and there earlier, and many scientists were taken with the idea of MEMEX, the famous library in a desk proposed by Vannevar Bush in 1945.⁸ But with Sputnik, scientific and technical information, as Adams points out, became a prime political concern.⁹ Appropriations to support science and technology grew even more rapidly, with the portion for study and improvement of information handling gaining as well. The year following Sputnik, the first of the series of prestigious panels and committees working in and out of the federal government began exploration of the problem. The investigations and recommendations of most of these are summarized in the 1969 report of the latest, the Committee on Scientific and Technical Communication of the National Academy of

Sciences-National Academy of Engineering. The subtitle of the report is significant, "A Pressing National Problem and Recommendations for its Solution," for, although many piecemeal advances have been made, the general problem still awaits definitive, unifying solutions.¹⁰ Significant also of what has happened—or not happened—in the years between, the SATCOM report includes a major role for libraries in its recommendations, in contrast to the very influential Weinberg and other earlier reports.¹¹

These reports attempted to cover science as a whole, but they addressed themselves primarily to the physical sciences and technology. Nevertheless, they were of substantial benefit to health science libraries in that they highlighted the overall problems and emphasized the need for a national plan to coordinate the proposed and existing efforts in both the public and private sectors rather than the creation of a monolithic, Soviet-style national information authority.¹² Important, too, was the stress on the responsibility of federal agencies concerned with science and technology to be equally concerned with effectively and expeditiously communicating new knowledge resulting from their programs to those in a position to use the knowledge in the public interest. Recommendations to develop switching centers and clearinghouses, to take advantage of electronic data processing and other new technologies, to repackage and compress the literature in accord with users' needs, to provide education and training in the information field, and to undertake research in communication have all clearly had long-range value for health science libraries and for promoting changes in their views on delivery of services.

Two studies during this period dealing specifically with communication of biomedical information were of more direct importance for health science libraries. These studies not only considered the libraries a very crucial part of the information system of the future, but also recommended the support necessary to carry on the functions assigned them. The first is the record of the Surgeon General's Conference on Health Communications held in 1962.¹³ The participants—special consultants from all parts of the country and Public Health Service staff members most involved with information activities—were asked to advise on short- and long-range goals to improve the flow of information from scientist to scientist, from scientist to health practitioner, and from practitioner to the public as a whole. The chief provisions for libraries were summarized as follows:

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The Public Health Service should give technical libraries support for their present activities and make funds available so they can experiment and broaden their role in meeting the needs of users, including scientists, health practitioners, health educators, and science writers.

The Service is urged to assist libraries to acquire sufficient space to make their acquisitions more usable, and to meet operating expenses for building and servicing their collections, for cataloging, and for personnel services.

.....
The library of tomorrow should be planned as a communication center rather than merely a repository for books.

Departure from the narrow and traditional view of technical libraries should lead to having in the modern library communication aids such as films, tape recordings, video tapes, programmed learning courses, and the equipment and services necessary to exploit newer means of communication and education.¹⁴

In addition, support for recruitment and training of communications personnel, including librarians, was recommended and funding for "research and development directed toward establishing a coordinated network for automated biomedical information processing."¹⁵ Attention was given to several other areas of direct concern to libraries such as the need for support for indexing and abstracting services and other secondary publications, measures for more effective use of foreign research results including support for translations, and funding for research centers for studies of health communication and education. These recommendations were in essence incorporated many deliberations later in the Medical Library Assistance Act of 1965. Research and development for a network for automated biomedical information processing was delayed until 1968 when the Lister Hill National Center for Biomedical Communications was established as part of the NLM. The interest expressed in audiovisual media and techniques took form in the strengthening of the U.S. Public Health Service Audiovisual Facility at Atlanta, now the National Medical Audiovisual Center and a part of NLM.

The year following the Surgeon General's Conference, the Division of Medical Sciences of the National Academy of Sciences-National Research Council issued *Communication Problems in Biomedical*

*Research.*¹⁶ This study gave particular emphasis to the medical library network. "Local biomedical libraries are logical channels for access to total resources for document and information processing."¹⁷ Again, "the libraries of academic and research institutions represent a vital component of the biomedical communication complex. This component has, however, deteriorated progressively from lack of support while the demands on it have steadily mounted. If institutional biomedical libraries are to function as local information service centers through which the scientist can tap the total national resources for document and information retrieval . . . strengthening this key component of the complex must have the highest priority."¹⁸ Support was called for to train personnel and to develop new and improved services and standards for both.

As in the Surgeon General's Conference, there were also recommendations of great interest to libraries for improvement in abstracting and indexing services and translation services. The pivotal position of the NLM in document retrieval and delivery was underscored, and the importance of the existing but endangered interlibrary loan network was recognized by devoting one of the eight supporting papers to it.¹⁹

The need for infusing substantial financial support into health science libraries had thus been clearly identified by leading health professionals and biomedical investigators as well as librarians before the middle of the decade, but there was no specific authorization to do so at that time in the Public Health Service Act. Communication, apparently even research in it, was interpreted as a component of the educational process, not as a part of the research effort. Libraries had long since attempted to secure aid from research funding but, aside from minor amounts some were able to secure from institutional overhead costs on research grants and contracts, they had little success, to judge from a 1957 panel on the subject.²⁰ It must be noted, however, that by 1962, in the mounting concern over information problems, the interpretation became more flexible. Limited funding for library research, innovations, or assistance to the institution's health research program was authorized from general research support grants which did benefit certain academic health science libraries to some degree.²¹ The authorization, incidentally, was revoked after the passage of the Medical Library Assistance Act of 1965.

One of the most influential factors in finally securing the enabling legislation for implementing the many recommendations which had now been made for improving the flow of biomedical information as it

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related to libraries was the report of the President's Commission on Heart Disease, Cancer and Stroke for *A National Program to Conquer Heart Disease, Cancer and Stroke*.²² The commission unequivocally documented the importance of medical libraries to the national health effort and presented these needs convincingly. It urged authorization for an extramural support program under the direction of the NLM to remedy past neglect and make expansion in new directions possible through training, research and a national medical library network developed from existing resources and patterns of cooperation. These items had all been identified in previous recommendations of other groups but were now clarified, amplified and couched in much the same terms as appear in the MLAA of 1965 which was passed some months later.

Although the focus of the commission was categorical, its interests ranged broadly and included the whole gamut of biomedical communications. The legislation which emerged from the commission's work, Public Law 89-239 or the Heart Disease, Cancer and Stroke Amendments of 1965, made provision for supporting a great variety of activities which in one way or another involved the transmission of new knowledge from where it was generated to where it could be applied to improve patient care and the health of the nation generally. Continuing education and training programs for all categories of health professionals became the key concept of the Regional Medical Programs, the complex, decentralized organization through which the new law was implemented.²³ The RMP legislation and the MLAA thus had the same ultimate goal—the improvement of the health of the people through communication of biomedical information—although the MLAA was, of course, in comparison very limited in scope as well as in funding. It had authority to give direct support only to continuing education programs for librarians and other communication personnel, but indirect support through library service was and is a most important objective. The RMP, on the other hand, was able to fund library service projects freely, provided they were supported through the local and state or regional RMP organizations. The coordination and practical results of these two sets of authorities will be taken up in a later section of this paper.

Service for continuing education programs is not new in health science libraries, but the dimensions have changed as parent organizations and affiliated institutions have grown increasingly aware of the urgent need for health practitioners to keep abreast of new developments and update their skills. A landmark in the efforts of

leaders of medicine and medical education to find answers to what by the beginning of the 1960s was recognized as a national problem of first priority was the Dryer report on "Lifetime Learning for Physicians."²⁴ The creation of the nationwide university without walls for continuing medical education called for in the report has not been realized, but through wide discussion the report has had much influence in directing attention to the issues it raised. The RMP from 1965 until the uncertainty in 1973 over its future stressed innovation and evaluation in continuing education as well as cooperative ventures among the schools, health professions, voluntary health organizations, public agencies and the public at large. The 1970s are witnessing a ferment in continuing education in all the health professions as requirements for recertification, relicensure and various voluntary schemes for continuing education shape up. Academic medical centers and community hospitals across the land are offering group learning experiences for practitioners of all persuasions, and a host of regional projects have been aimed at equalizing access to learning opportunities of all kinds. With the change in emphasis in public interest during the past decade from biomedical research to delivery of health care, many new developments are occurring which are directly or indirectly related to maintaining a standard of patient care acceptable in the light of current knowledge of health and disease. Some academic centers have begun offering continuing education packages to groups of hospitals. New organizations are forming, notably health maintenance organizations, professional standards review organizations and area health education centers.

HMOs and PSROs have been much in the news recently and will not be considered here. AHECs, however, are less well known outside the medical literature and, therefore, perhaps need a brief note. The AHEC concept stems from the Carnegie Commission's 1970 study of the shortage of professional health manpower and the uneven geographic distribution, especially in rural areas and inner cities, of health personnel and educational facilities. The study proposed establishing training and continuing education centers in local hospitals in communities without a university health science center but with local center administration directed by a university health science center.²⁵ In the United States 126 areas were identified as needing resources of this kind, but only eleven centers have been established thus far. These vary widely in organizational detail, but at least three are reported to have library components; in any case, whether such

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components are built in or not, AHECs are certain to produce a sizable demand for library services.

Although continuing education is almost uniformly equated with making new knowledge available to those who have completed their formal education, it goes beyond this. George Miller, in a provocative article decrying this view, writes: "Continuing education should mean continuing self-education, not continuing instruction. If this desirable goal is to be accomplished, there must be movement away from the content model, which encourages dependence upon teachers, to a process model, which demands a significant measure of self-reliance—a shift away from preoccupation with courses and methods, toward an augmented concern for educational diagnosis and individualized therapy."²⁶ This view is one with which few people would disagree. Moreover, with population pressures and national health insurance making enormous increases in the number of both health professionals and health care institutions inevitable, increases in self-education are equally inevitable, whatever else the reason. An obvious corollary is a multiplication in library service since libraries are designed primarily to assist individual users to pursue individual study.

In summary, it is evident that problems associated with information control have been the directing force behind health science library service during most of the 1960s. Until well into the second half of the decade the chief concern was with information service within individual institutions, although interlibrary loan and duplicate exchange activities have always been prominent on the medical library scene and have furnished the base for the regional development of the latter part of the decade. Regional developments are strongly linked to national concern with patient care and continuing education. These in turn have given great importance to the goal of equalizing access to information within the region and from there across the nation. This goal is unlikely, in the nature of things, to supersede preoccupation with service to the parent institution through acquiring, organizing and giving service from institution-owned information materials, but it does appear to be reducing the degree of concentration and widening the horizon.

The next sections of this paper are devoted to the more specific aspects of the solutions tried first for information problems, then for equalizing access. Solutions have been sought through support legislation, as already noted, and through application of new technology. The latter has not been given special attention because it

has been so widely discussed for so long in the general literature of librarianship. Moreover, new technology touched most health science libraries first through NLM's Medical Literature Analysis and Retrieval System. The relationship of the NLM to the other health science libraries of the country, although undoubtedly a—if not *the*—prime factor in the changes in information delivery, is connected more to solutions than to general background considerations and thus is best treated separately.

INFLUENCE OF THE NATIONAL LIBRARY OF MEDICINE ON
HEALTH SCIENCE LIBRARY SERVICE

For the last hundred years the National Library of Medicine has been the leader in collecting, indexing and disseminating the world's medical literature, but it was not until after the publication of the epochmaking survey of 1944 that the library, at that time the Army Medical Library, could truly be called a library's library. The library had been steadily declining in collections, housing and service since the 1920s. The momentum given it by John Shaw Billings, the remarkable physician who formed its character as a national library during his long tenure (1865-95) as director, had reached its end; complete renewal was required if the library was to catch up with the present and move into a useful future.²⁷ In connection with public services the survey suggested that "it would seem fair to consider the Army Medical Library as the central research collection of the medical libraries of the country. . . . There are many other medical libraries scattered throughout the United States, some large, some small, each one of which may be fairly expected to care for the general needs of those who live within convenient distance, to the limit of its ability. Calls should be made on the Army Medical Library only for material that cannot be supplied by the local medical library."²⁸ In addition to serving as the hub of the medical interlibrary loan network, the library administration was advised to maintain close relations with other medical libraries of the country as well as with the Medical Library Association and other library associations.

Ten years later, in 1954, the library was able to report that the survey recommendations had been realized in large degree. Specific evidence of a new orientation toward libraries and librarianship was the publication and regular updating of a modern classification scheme for medicine, availability of its cataloging output in both card and book form, tripling of interlibrary loans and fivefold expansion in

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photoduplication service, to say nothing of the new bibliographical services which benefited libraries and individual users alike.²⁹ Two years later, in 1956, the National Library of Medicine Act was passed. The library was transferred to the Public Health Service and became in name what it had already been in fact. The new law defined the library's mission in broad terms that not only acknowledged the importance of the dissemination and exchange of information to the progress of medicine and the public health, but also made NLM the appropriate agency to administer the MLAA of 1965, all aspects of major significance for the health science library field.

Not long after its recognition as a national library, NLM began an intensified search of methods by which it might be able to improve bibliographic control of the medical literature and overcome the limitations of its major periodical index, the *Current List of Medical Literature*. The first step was replacement of the latter in 1960 by *Index Medicus* which was produced by an ingenious mechanization system.³⁰ Frank Bradway Rogers, then director of NLM, in announcing the new index, wrote: "Let medical librarianship think of the *Index Medicus* not as something which *they* publish, but as something which is *its* own. . . . May this tool play its destined part in helping bibliography and librarianship to make increasing contributions toward the advancement of medical sciences."³¹ Well before the first issue was out, study was underway to determine the feasibility of going on to a combined publication and bibliographic retrieval system using electronic digital computers. By 1964 MEDLARS was operational and *Index Medicus* had become a product of its publication module. Its subsequent development and evolution into MEDLARS On-Line (MEDLINE) is traced by Rogers in another paper in this issue. The point here is that through NLM's pioneering effort to reduce the information problem in the health sciences, librarians in the field had an early introduction to the use of computerized information retrieval systems, suffered along with NLM through the initial stages and emerged psychologically prepared for the opportunity they now have to interact directly with the system.

The year 1967 saw the organizational transfer of the National Medical Audiovisual Center, formerly a part of the Public Health Service's Communicable Diseases Center, to NLM. Libraries had long used NMAC's various catalog listings of audiovisual materials and borrowed from its film collections. The merging with NLM, however, brought NMAC's work with educational systems closer to libraries. Many librarians have now attended their audiovisual orientation

workshop in Atlanta and are taking advantage of services such as the copying of selected items from NMAC's videotape collections. The importance of clear channels to expert advice and assistance in promoting receptivity in libraries to these newer media is obvious, especially so in view of the enormous amount of audiovisual material produced for the health sciences and the myriad problems in its evaluation.

The following year, 1968, Public Law 90-456 was passed establishing the Lister Hill National Center for Biomedical Communications as a part of NLM. Its mission is to support research and development necessary to carry out NLM's national responsibilities for improvement of biomedical communications on a broad scale; the design and development of a national Biomedical Communications Network is the primary purpose of the new center. Ruth Davis, first director of the Lister Hill Center, identifies five components in the BCN: library services, specialized information services, specialized educational services, audio and audiovisual services and the data processing and transmission facilities component which holds the other four together in a "disciplined network."³² The library component, as McCarn pointed out, antedated the BCN in the form of the regional document delivery system and the network of MEDLARS search stations.³³ Within a short time, however, benefits from the other components began to accrue and are now exerting a marked influence on services offered by health sciences libraries. For example, MEDLINE developed from the Lister Hill Center's interest in experimenting with on-line retrieval under conditions which would make it widely practical. From NLM's Specialized Information Services, specifically the Toxicology Information Program, has come TOXLINE, another on-line citation retrieval service, which includes some libraries among its current subscribers and will undoubtedly pick up many more in the near future when handling passes from the outside contractor back to NLM. (The TOXLINE data base deals primarily with the pharmacology and toxicology of drugs, pesticides, environmental pollutants and hazardous chemicals.) In the makings is an on-line interactive toxicology data bank which will contain chemical, biological, clinical and production data on hazardous compounds, another service which could be appropriately tapped through libraries.³⁴

NLM has actively sought the help of the health sciences education community in planning for the specialized educational services and the audiovisual facilities components of the BCN so that the services

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developed will relate directly to the needs perceived by those most closely concerned with satisfying them.³⁵ National professional societies, the Association of American Medical Colleges and the American Association of Dental Schools have cooperated in projects for the evaluation of instructional media, some of it materials in NMAC collections, some of it available from academic centers and elsewhere.³⁶ In addition to the NLM funded study of the joint AAMC-MLA committee on guidelines for medical school libraries referred to earlier, the AAMC has also undertaken two contractual studies for NLM of special interest to academic health science libraries. The purpose of the first study, "The Health Sciences Library: Its Role in Education for the Health Professions," was to provide criteria and guidelines in designing libraries for the future. It is a very useful report from the point of view of both librarian and medical education administrator; it stresses the potential future importance of the library in solving information problems and in making larger contributions to the educational effort.³⁷ The second report, "Educational Technology for Medicine: Roles for the Lister Hill Center," is only incidentally addressed to library problems, but it does, in a more or less ambivalent tone, advocate an additional role for libraries as biomedical communication centers. At the same time it raises questions about whether libraries are pointed in the right direction and emphasizes the need for utilizing new technology for organizing and transmitting health science information and using new media resources as well as printed books.³⁸

Of more immediate application in libraries are other products of the education-related components of the BCN. One is an NMAC data base, AVLINE, designed for on-line retrieval of information on nonprint, instructional materials which have been evaluated, cataloged and indexed. When this becomes available, the ability to offer services from it will almost inevitably turn libraries toward additional services in the audiovisual field. Another new development with great promise as a service which can be delivered from libraries is the Lister Hill Center's experimental computer-assisted instruction network. Created originally in response to one of the recommendations in "Educational Technology for Medicine," the goal is to test the transferability of CAI programs as part of a mechanism for interinstitutional cooperation in sharing medical education resources.³⁹ Several libraries are among the participants in this experiment, at least a few as active and major partners in the utilization plans of their institutions. The experiment is scheduled to be completed in May 1975. It is mentioned here as

another illustration of the present and potential effect of the BCN on the delivery of information service in libraries. A full discussion of CAI in medical libraries is given by Smith in an excellent recent article.⁴⁰

NLM has influenced changes in library services even more, of course, through its Extramural Programs Division which administers the provisions of the Medical Library Assistance Act. NLM spearheaded the drive for this legislation and prepared its specifications on the basis of recommendations in some of the major reports considered above and after consultations with librarians and user groups in the health professions. Important, too, in shaping services has been the interaction between the MLA and the NLM. The latter in 1964 suggested the establishment of a joint committee, now known as the MLA-NLM Liaison Committee. Its purposes were and are: "(1) to assist NLM in obtaining the organized support of the professional society most closely allied to its work, (2) to determine long-range needs in medical librarianship, (3) to serve as a feedback mechanism for both groups and (4) to aid in planning future joint efforts."⁴¹ The MLA's Federal Legislative Policy adopted the same year included a very strong statement of support for NLM which began, "The services developed by the NLM, the world's largest and most complete medical library, are vital to all other medical and allied science libraries throughout the world and are an important factor in the forward movement of research in the health field, the improvement of patient care, and the sound education of students, as well as a contribution to the betterment of international relations everywhere."⁴²

NEW AND EXPANDED SERVICES DEVELOPED BY
HEALTH SCIENCE LIBRARIES SINCE 1960

Previous sections of this paper have dealt with pressures for changes in information delivery in health science libraries during the last decade and the influence of the expanding role of the NLM on services available through these libraries. In this concluding section consideration will be given to new or expanded services health science libraries have developed primarily on their own initiative through funding from authorizations in the MLAA of 1965 and its 1970 extension, the Regional Medical Programs and other sources. The source of funding is not in itself important except for the objectives and limitations which may come with it. Also, it is frequently impossible to identify support sources accurately or to determine where changes in

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institutional budgets have been the chief factor in new services and where the library's reallocation of its own resources have figured.

Subsequent papers treat in some detail the use of new bibliographic services, improved document delivery, automation of processing, handling of nonprint materials, better buildings, innovations in reference service and formation of cooperative networks. Only a general overview of these efforts in relation to pressures and influences which have already been identified will be attempted here.

The Medical Library Assistance Act of 1965 had two prime goals: (1) to aid health science libraries to improve their services and resources in order to respond more effectively to user needs, and (2) to promote a national system of regional health science libraries in order to equalize access to health sciences information for health professionals regardless of their geographic location. Of the eight program provisions in the MLAA, the one authorizing regional branches of NLM was never implemented. Two others, support for biomedical scientific publications and special fellowships for scientists and practitioners to write on scientific, social and cultural advancements in the health sciences, are not directly related to libraries. Four of the remaining provisions are concerned with upgrading medical libraries and the fifth with regionalization. The two goals are, of course, closely interrelated, with the first almost a prerequisite for successful implementation of the second. During the five years of the original legislation, 1965-1970, emphasis was on the first goal through most of the period. With the Medical Library Assistance Extension Act of 1970 the second goal began to overtake the first, a logical progression in view of the acceleration of the Lister Hill Center's Biomedical Communications Network. Indications are that most of the extramural programs will be slanted toward the regional concept during the next period. It should be noted again at this point that the MLAA and its extensions are administered by NLM's Extramural Programs acting under the guidance of peer review committees of nonfederal consultants and the policy-setting Board of Regents of the NLM.

The four provisions which most directly assist the individual medical libraries of the country are (1) construction of new facilities and renovation and/or expansion of existing facilities, (2) training of medical librarians and other information specialists, (3) research and development in health sciences librarianship and related fields, and (4) improving and expanding basic resources. The way in which libraries used these provisions during 1965-70 is covered in an incisive analysis by Cummings and Corning of the extramural program as a whole

during this period.⁴³ Funds appropriated over the five years totaled \$40.8 million or only 39 percent of what the legislation authorized. Of the money appropriated, 29 percent went to resources, 28 percent to construction, 15 percent to research and development in communications, 12 percent to Regional Medical Libraries and 11 percent to education and training. Funds fell shortest in the construction program where projects approved but not funded amounted to nearly \$35 million. Nevertheless, eleven academic health sciences libraries received NLM construction grants which played a major role in financing some of the most outstanding health sciences libraries in the country.

It is estimated that from construction funded under the Health Manpower Act of 1968, the Comprehensive Health Manpower Act of 1971 and previous related legislation, over \$44 million went to seventy-three institutions for library construction or renovation from July 1965 to August 1973.⁴⁴ Thirty-four of these were medical school or academic medical center libraries; these combined with the nine of this type funded under the MLAA bring the total to forty-three or 37 percent of all U.S. medical schools. In addition, Hill-Burton funds for hospital construction have included a larger number of libraries, although statistics on costs and square footage are not readily available. There has also been important library construction and renovation without benefit of federal funding, but no information is available on how much. In any case, although the need for improvement in the physical facilities of health sciences libraries remains large, what has been accomplished is of signal significance not only for the individual institution's users but in the larger context of the BCN as well. The existence of adequate physical facilities as service centers in the network is critical.

At the time the MLAA was drawn up, there was a national shortage of librarians, very little training was available for any kind of subject specialization and courses dealing with new communication technology were a novelty. In medical librarianship recruitment was particularly difficult because so few students from the sciences entered the field, but there were modest training opportunities—four internship programs and single courses in nine or ten library schools—because of the MLA's certification plan.⁴⁵ The NLM training program carried provisions for traineeships to support work for graduate degrees (M.L.S. and Ph.D. levels) in health sciences librarianship and information science, for institutional programs in these two areas, for internships in health science libraries and for

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retraining, special training and continuing education of health science librarians and information specialists. In the first five years six internship programs, including two already in existence, were funded, nine degree programs were established and about 350 people were supported. All of the internships and seven of the degree courses were in health sciences librarianship. In a review of health science library education from 1957 to 1971, Roper describes the characteristics of the NLM-funded programs and gives 181 as the number who completed them during 1966-70.⁴⁶ Only five of the programs were in existence the whole five-year period and two did not begin until 1970. There were no new library programs after 1970, and two of the internship programs dropped out, but a total of well over 300 NLM-supported trainees completed programs during 1971-73.⁴⁷

The training programs are too new to evaluate in long-range terms, but the number of recruits who have stayed in the field is high and a good number are making notable career progress. The programs attracted many with strong backgrounds in the health and biological sciences and have served to publicize medical librarianship as a career to faculty and students who might otherwise have remained unaware of it. The training has proved invaluable in supplying well-qualified and future-oriented personnel for health science libraries, but, although recruiting is considerably less difficult than it was in 1965, there are still not enough really well-prepared, first-rate librarians for the posts available, especially in nonurban areas. It is therefore most unfortunate that just as a balance between training opportunities and vacancies appeared to be in the offing, the NLM programs were ordered phased out along with all the other federal training programs in the health sciences. In some cases the health science library programs are planning to continue on other funding, although at a lower level of activity, but it is too soon to have a clear picture of just what will remain after the phase-out is completed. Kronick, et al., summarize their exhaustive survey of manpower in health science libraries in this way: "Although there does not appear to be a serious manpower shortage in terms of budgeted positions which are unfilled (*demand*), the manpower situation can still be considered serious when we introduce into our evaluation of the situation the question of existing levels of training and the urgent requirement (*need*) to bring manpower levels to a point at which adequate information services can be provided to the whole health sciences community."⁴⁸

In the continuing education field the MLAA has not yet brought about much change except at the technician level through the Regional

Medical Library Program. Support has also been given to studies and planning being carried on within the MLA and to institutes sponsored by it. The restrictions on training and the size of appropriations may make it impossible to do more for the present. However, NLM three-week training classes for MEDLINE search analysts are offered several times a year at both NLM and UCLA and are followed by periodic one-day conferences to discuss problems in search strategy, system changes, and general management. These plus the audiovisual orientation courses at NMAC and the continuing education program of the MLA constitute at least a good beginning in retraining and special training to improve delivery of services.

The Research and Development Program inaugurated by the MLAA aimed at enabling health science librarians to explore new ways to handle service responsibilities and at encouraging research on development of new systems and techniques for improving biomedical communications. In the first five years fourteen projects in the library services, operations and manpower area and forty-three dealing with various aspects of communications were funded. Those with useful applications for health sciences libraries have included development of the first on-line serials control system, total systems approach to automation of technical processing, centralized processing for a group of libraries, methods for evaluation of self-instructional materials, roles for the library in continuing education, SDI systems, studies of communication patterns among medical researchers and health manpower surveys. Perhaps the most interesting and innovative project funded in the three-year extension period has been the design of a patient care information system implemented by assignment of librarians qualified by training and subject background to serve on a teaching team. The librarian accompanies a team of faculty members, house staff, nurses, pharmacists and students on rounds, attends and participates in their discussions and has access to patient charts. The librarian's job is to cover the information and literature needs of the team.⁴⁹

To date the research and development program has not been as productive as had been anticipated. New research methodology has not been a prominent feature and few projects have led to application and implementation of new modes of communication.⁵⁰ As the status of librarians improves to include time for research, and as more librarians trained in systems work and application of new technologies are employed in health science libraries, better and fuller use certainly will be made of this source of research support. This provision should

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also serve as an attraction for those with a bent for investigation to enter the health sciences library field.

The Medical Library Resource Grant Program provides funds for establishing or improving collections through acquisitions and processing, for the application of new technologies, for purchase of equipment and for enhancing services to users generally. In the initial five years, 402 libraries were assisted with a total of \$11.8 million, more than 50 percent of which went for books, journals and other informational materials, while another 16 percent went for equipment. Some libraries used funds for extension services (mainly for photocopies and interlibrary loans), many for processing materials either new or in backlogs, and a smaller number for projects such as reclassification of collections from older, less modern schemes to the NLM classification, revision of subject catalogs and subject heading authority files, automation (especially in the serials area), union list activity and photoduplication services.

There has been a certain degree of disappointment among those responsible for the administration of the Resources Grant Program that so much of the funding went for material rather than for improving the nature and scope of services.⁵¹ In the opinion of this writer, however, from grassroots observation, the program has had a very positive service effect, though admittedly one which cannot be easily measured. Collections are the basis of library service and always will be whether they reside on library shelves or in data banks, and even now, ten years after the passage of the MLAA, we are only at the point of using bibliographical data banks. Moreover, although 402 out of from 3,000 to 6,000 or more health sciences libraries, depending on what is considered a viable library, is not a large number, for those 402 it was a remarkable and exhilarating experience to have the means for any kind of expansion beyond the subsistence level. The experience affected outlook and attitudes toward what could be done for users and brought a good number of librarians who had been more or less isolated into the mainstream of health science librarianship. In addition, in many instances, especially in hospitals, administrators acquired a new awareness of their libraries because of the existence of the outside funding. The administrators may not be able nor willing to continue the added support, but the awareness cannot be totally erased.

For the most part, there are few changes in the Medical Library Assistance Extension Act of 1970 from the provisions in the original legislation except that the authorization for appropriations is higher in

four of the seven programs and the period of authorization is reduced from five to three years. (An additional extension without further change was included in the Health Programs Extension Act of 1973.) However, in the Resource Grant Program there was a significant redirection reflecting the view that there was no clear statistical evidence that the program had stimulated increased local support from grantee institutions, nor that it had had a major influence in improving services. More importantly, it had not contributed to national coordination of effort and resources and the planning of an information dissemination system.⁵¹ In the earlier years, although there was a requirement for a statement on how the awards were to be used, the grants were for general support based on a percentage of the library's budget, the amount of the award decreasing each year after the first, with the institution presumably picking up at least a part of the decrease. In the extension legislation two kinds of awards are made—improvement grants and project grants. The former have a \$3,000 limit and are for assistance in establishing basic resources; the latter are for developments which demonstrably and specifically improve services and can be related to Regional Medical Library planning. In both cases an institutional commitment to continue to support the intent of the grant is required.

Improvement grants have an important role to play in providing money for libraries in new hospitals and in transforming unorganized and often poorly selected collections of books with little or no personnel attached into basic unit libraries which form the foundation of the national medical library network. Probably the most important factor in equalizing access to information for health sciences practitioners lies in increasing the number and effectiveness of these libraries and in assisting them to become community health information centers in the community hospital center setting. Through the fiscal 1971-73 extension, 304 improvement grants were made at a total of close to \$1 million.⁵²

Project grants are of interest to larger libraries, including the larger hospital libraries. During the three-year extension period, 157 projects were funded for \$4.3 million. It should be noted that provision for assistance in establishing collections was carried over into the extension period but only for libraries of new health sciences schools. Thirty-nine awards were made for this purpose and eight for alterations and renovations too limited to qualify as major construction. Fifty grants were made for technical processing including seven automation projects. The remaining awards were for nonprint collections, reader

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services, library-related history of medicine projects and extension services. Though the ratio of service to material improved, the latter still took a large piece of the total, but probably for the last time. It is interesting that the objective of a number of technical processing projects in both the extension period and the earlier period was to bring classification and cataloging systems more in line with NLM practices in order to avoid duplicating so much of what NLM had already done. With the advent of CATLINE (NLM's *Current Catalog* on-line) as one of the MEDLINE data bases, these projects should prove doubly useful.

The Regional Medical Library Program was not implemented until late in 1967 when the New England Regional Medical Library Service was established at the Francis A. Countway Library of Medicine in Boston, but the other ten Regional Medical Libraries followed in rapid order with the last operational by mid-1970. The RMLP is an evolving program, but from the first its purpose has been to develop, under NLM leadership, a strong national medical library system built upon existing libraries with the greatest potential for providing regional services. A region was defined as a geographic area composed of part or parts of one or more states that are integrated by population trends, location of transportation and communication facilities and distribution of health service, research and professional education programs. The need for planning and cooperation among all the actual and potential users and providers of health information within the region was stressed, as was also the supplementing rather than supplanting nature of the services to be provided.⁵³

At the outset it was widely assumed that there would be appreciably more than eleven RMLs, but even the authorization of \$2.5 million annually, let alone the appropriation, precluded many more. The formation of very large regions meant that, in several, no single library could be clearly identified as having the greatest potential for regional service. The solution was decentralization into a coalition with a headquarters library. Changes since then have resulted in most regions adopting a decentralized pattern but, except for administrative matters, both centralized and decentralized RMLs have functioned in the same overall pattern with the aim being to incorporate as many resources of the region as possible into the network. The latest policy statement for the RMLP postulates an operational model of hierarchical design with four levels. Libraries of community hospitals, colleges and junior colleges with health sciences education programs, research organizations and governmental agencies form the base of

the pyramid; resource libraries (generally in medical schools) form the second level; the RMLs the third level; and the NLM the fourth. Like most models, this one oversimplifies the relationships which actually exist among the medical libraries of the country, but it does give a starting point. The network is described as "a logical basis for extended cooperation between existing institutions in support of their fundamental constituencies by making available to each the library resources of the nation. In return for access to this invaluable resource, the individual participating institutions are expected to extend the availability of their own resources beyond their prime constituency to a much wider community."⁵⁴

In an analysis of the complete policy statement, Pings comments, "the development of the RMLP has certainly not been consistent, and not by any stretch of the imagination can it be said that a national 'network' of biomedical libraries has been formed. At best some RMLs can argue that they are on the way to creating a regional network. This is still, however, a regional phenomenon."⁵⁵ No one who is an active participant in the RMLP would be likely to find too much fault with this appraisal nor fail to recognize a good many of the problems identified by Pings, some of them the same as those anticipated by Esterquest as the program began in 1967.⁵⁶ Nonetheless, exciting progress has been made in the seven short years the RMLP has been in existence and its impact on the delivery of information services in health science libraries has been great. In document delivery service, the primary area of RML activity, not only has the number of loans doubled and redoubled, but the fill time, a matter of great concern to users, has improved remarkably, the vast majority of loans in 1972/73 going out within four calendar days and a high percentage of these on the day received or the day after.⁵⁷ The referral feature which is an intrinsic part of the RML network greatly facilitates the location of difficult-to-find materials. More important than the increase in number of loans made is the increase in the number of new basic unit libraries—most of them in hospitals—who use the system. The statistics for RML document delivery are for RML-funded loans, but there is a large though haphazardly recorded and unrecorded amount of interlibrary loan traffic among health science libraries which does not fall in this category but has been stimulated by it. Two devices which should be mentioned in connection with the RML document delivery system are (1) the widespread use of TWX among health science libraries and (2) the number of serials holdings and union lists which have been compiled by these libraries, including NLM's

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SERLINE (Serials on-Line: current titles in NLM and major resource libraries). SERLINE will eventually play a part in the switching of interlibrary loan requests for journal articles from point to point in the on-line communication system.

A second service decentralized by NLM and offered in all regions either at the RML or at a search formulation center in the region was MEDLARS demand search service. In addition to the service itself, workshops for librarians and shorter seminars for health professionals were given in various areas of the region to publicize and facilitate use of the service. This effort has been continued for the new MEDLINE service, but now usually in collaboration with the staff of libraries with MEDLINE installations. MEDLINE is giving the developing network a tremendous boost forward. As of December 1973 there were 190 institutions in the United States with MEDLINE installations.⁵⁸ Included were not only all the second and third level libraries in the RMLP model but a good number of fourth level or basic unit libraries, several of them associated in consortia of three or four members in the same area in order to utilize a time slot more efficiently, help one another with the search load during vacations and other periods of short staffing, and work out cooperative acquisitions and interlibrary loan arrangements. It would be misleading to imply that these purposes have materialized in successful programs at this early date when none of the consortia are more than a year old, but a beginning has been made. Moreover, a few of the groups had already been associated together informally for interlibrary loan support and acquisitions planning for quite a time. RML's have been given the responsibility for coordinating and monitoring both the document delivery system and the MEDLINE regional network. In doing this they have also become involved in varying degrees with the major resource libraries of their respective regions in working out plans for coordinating acquisitions both as an antidote to stationary budgets and inflated prices and as a means of better balancing the resources of the region.

Much more could be said about the way in which other RML services—e.g., reference service, and consulting and training at the technician level to aid developing hospital libraries—directly and indirectly relate to changes and improvements in what users receive from health science libraries, but space does not permit such a discussion. Moreover, at this time there is great unevenness from one region to another in the degree to which these services are available; in the light of the funding all other activities have had of necessity to be

regarded as more or less auxiliary to document delivery and search service.

The Regional Medical Programs authorized under the Heart Disease, Cancer and Stroke Amendments of the Public Health Service Act were discussed earlier in relation to library service as a support for continuing education for health professionals and the similarity of goals between RMP and NLM programs noted. It was thus to be expected that strong effort would be made to coordinate the RMLP with RMP support to libraries, and this was indeed the case at both the federal level and between the RMLs and directors of RMP library projects, although less frequently from one RMP region or area to the next. In a 1967 address, Margaret Sloan of the RMP declared, "We are encouraging Regional Medical Program grantees to apply for library assistance and to seek the guidance of the National Library of Medicine staff . . . in the development of their regional plans. . . . The community hospital figures large in our hopes for a brighter future. These hospitals will become the medical teaching centers for their communities, and libraries will be an essential key with all ancillary teaching aids now available and to be developed."⁵⁹ Two years later Kefauver, then NLM Associate Director for Extramural Programs, stressed the same theme of mutual interests and cooperation with RMP. He pointed out, too, that the fifty-five RMP regions which had been established by that time were of much smaller geographic area than the RML regions and might as a result be able to discover and react to differing local needs more effectively than the RMLs. The latter were advised to include RMP representation on their advisory committees and almost all did.⁶⁰

RMP funding was very substantial, the horizons were broad and there was much talk of RMP-funded subnetworks becoming the underpinnings of the RML network. In the final analysis, however, library support has not been a conspicuous element in RMP development and what projects were funded were not distributed in any rational geographic pattern. The great emphasis on local, grassroots origins for all operational projects accounts for this situation in part at least, for it almost insured at least some degree of resistance to regionalization and coordination and great variations in strength and effectiveness of programs.

Critics and champions of RMP are many and vociferous. The critics were ahead during most of 1973 and phaseout orders were handed down from the administration as of July 1, 1973, but the champions are in front again now with a year's reprieve. All library projects, however,

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have been terminated. During the period 1965 to the phaseout-period nationwide there were a total of twenty-nine library projects funded at roughly \$4 million out of a total of \$31.7 million for 273 communication programs with primary emphasis on electronic communications, libraries, audiovisuals and other educational resources, data systems and the community-based Health Service Education Activities. Another \$32 million went for 169 projects in which these same elements were involved but with secondary emphasis.⁶¹ In addition, a certain number of pilot projects and other library activities were funded from RMP core budgets, but estimates of the actual amounts are not available.

Library projects, whether from core funds or on separate operating budgets, were subject to the general RMP policy that projects find alternate funding or be self-funding after a certain period of time—as a rule not a realistic expectation for library extension service. How many of these projects have found funding is not yet known. In any case, in the regions where they functioned, they had great impact on delivery of information services, especially to practitioners and others concerned with patient care in areas where medical library service had in the past been either absent or very limited. Most of the projects were subnetworks through which all or a combination of the following were given: document delivery, including photocopy, reference, bibliographical, and consulting services. There was much emphasis on workshops for technician level personnel managing hospital libraries and, in some, on audiovisuals. Attention was given to making union lists and to the concept of core libraries for hospitals popularized through the lists developed by Stearns and Ratcliffe at the Postgraduate Medical Institute in Boston, another RMP project.⁶² Subnetwork activities were very much like those of RMLs though considerably more emphasis was placed on reference service in most instances and the use of WATS lines. Some collection building was done, notably for the Alaska Health Science Library at Anchorage, the only medical library in that state, and for HINOP, the Health Information Network of the Pacific, based in Honolulu. An overview of RMP library activities as they were in 1969 is given by Schneider who also notes that many nonlibrary-based information projects do involve libraries indirectly, as, for example, in furnishing literature support for the telephone dial access mini-lectures for physicians and nurses.⁶³

The strong internal and extramural programs of the NLM plus the supplementary assistance for regional services given by the Regional Medical Programs cannot be overestimated in importance, but they are

not the only avenues through which health science libraries have brought about changes in delivery of information. There have also been a variety of independent developments within the medical library community which have significantly influenced the thinking of its members. Some of the most visible will be briefly noted below.

In the automation area the first work of widespread interest was the Columbia-Harvard-Yale Medical Libraries Computerization Project which dates from 1962. The goal was to design and implement an on-line bibliographic information retrieval system which would integrate cataloging information from the three libraries with indexing information from MEDLARS for selected journal articles.⁶⁴ The full goal was not reached, but the effort produced much useful information about cooperative and computer-assisted cataloging, some of which must have guided Frederick Kilgour, the chief force in the project, in his later work on the highly successful Ohio College Library Center. At almost the same time Washington University School of Medicine Library at St. Louis began its studies on computer applications in libraries, and in 1963 issued the first report in its very instructive series, "Mechanization of Library Procedures in the Medium-Sized Medical Library," which has been appearing at frequent intervals in the *Bulletin of the Medical Library Association* ever since. The short courses held regularly in earlier years, the reports and the various computerized products which are available from this library have encouraged a number of libraries to systemize procedures and consider either automation of their own records in-house or through the St. Louis system.⁶⁵ Cooperative use of computerized data bases and/or programs has begun or is contemplated in a number of other libraries, but there are still compatibility problems of one kind or another to solve.

Among the best known cooperative projects in the health science library community are the Medical Library Center of New York and the State University of New York Biomedical Communications Network. The latter is the first on-line bibliographical system to have been developed in the health sciences. It became operational at the end of 1966 for exchange of interlibrary loan data, reference data and other administrative messages concerned with the participating libraries and the network. Several data bases with varying purposes are now available within the system. The SUNY system is considered elsewhere in this issue and has been described in detail by Pizer⁶⁶ and by Bridegam and Meyerhoff.⁶⁷ The Medical Library Center of New York was incorporated in 1959 to serve as an integrated storage facility

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for the medical libraries of the New York City area and to provide several services for them, including cooperative central acquisitions of less-used current serials and reference works, dissemination of materials held by the center, an information service, research on cooperative solutions for library problems and a Union Catalog of Medical Periodicals for the New York metropolitan area.⁶⁸ The latter was developed as a computerized list which has been expanded in the last several years to include the regularly updated holdings of a large number of medical libraries across the country.

Another interesting development in information delivery is the library-based information analysis centers of the Neurological Information Network of the National Institute of Neurological Diseases and Stroke. The four original members of the network were the Parkinson's Information Center at Columbia University, the Brain Information Service at UCLA, the Information Center for Hearing, Speech and Disorders of Human Communications at Johns Hopkins and the Vision Information Center at Harvard. The first has been phased out, although its current alerting function has been absorbed in a recurring bibliography produced from the MEDLARS data base and sponsored by NINDS. The Vision Information Center was phased out when the National Eye Institute took over research areas formerly assigned to NINDS. Meanwhile a new center, the Clinical Neurology Information Center, covering all of clinical neurology, has been established at the University of Nebraska Medical Center. These centers support conferences, carry on a publications program, promote the writing of critical reviews, provide current alerting and give retrospective search service to a large national and international group of users. In all cases there has been some kind of formalized relationship with the large medical research libraries of the sponsoring institutions. At Columbia and at UCLA the centers organized with two distinct though close-knit units, the scientific and the bibliographic, the latter being a special department of the library. Several descriptions of the centers indicating the high level of success attained appear in the literature, but the times have not proved propitious for expansion into other subject areas and may not sustain the three still in operation.⁶⁹ The clamor of the early 1960s for specialized information centers federally supported has faded considerably.

In summary, developments through the 1960s and into the 1970s have pointed health sciences libraries in the same direction toward one still distant goal. The goal, as this writer interprets the signposts along the way, is the gradual conversion of the health sciences library into a

communications center working actively with informational materials of all kinds, close at hand or distant, for health professions users in the community as well as in the institution. This paper has attempted to demonstrate progress toward this goal in the way health sciences librarians have moved to capitalize on opportunities to improve delivery of information and have themselves developed new opportunities. Fred Cole's introduction to the last annual report of the Council on Library Resources sums up the situation very well:

In spite of the financial stresses and strains imposed upon the libraries of this country, there seems to be much movement forward. There seems to be progress in cooperative efforts. There seems to be improvement in management and administration. There seems to be advancement in the development of cost-beneficial automated procedures. Most important of all, there appears to be a better understanding in this country of the importance, even the absolute necessity, of a strong library system. . . . Perhaps these developments are not yet what they seem, but we are hopeful.⁷⁰

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