Network Alternatives and Solutions for Storage

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THE RATIONALE FOR RELATING library network developments to library storage problems warrants at least a few introductory remarks. Sections of other contributions touch on certain significant and related matters: the conclusion of agreements for planned acquisitions programs and specialized, sharable resources; the decentralization of institutional holdings with arrangements for access; and the establishment of centralized storage facilities, cooperative and otherwise, with access and/or transport of informational materials. Such activities obviously have network characteristics about them.

By and large, library networks are not established to alleviate storage problems but to enhance accessibility to information resources. One may consider their success as preventive therapy, making unnecessary the duplicative acquisition of such resources by the participants. The possibility is presented, also, of removing some portion of a crowded collection, if the removed segment is already available in or becomes part of an accessible organized resource. It should be recognized that such networks may or may not have relevance to planned acquisitions programs, for either the central storage resource or the participants' own collections. Then, too, networks may relate to communication of bibliographic information only; the hypothetic remote accessing of a MARC data bank would qualify as some kind of network activity, but unless copy location is provided there likely will be no easing of storage problems. The various prototype or operating networks thus may deal with bibliographic access or physical access to information, or to both requirements, and one needs to bear the distinction in mind when considering their present relevance,

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for networks *per se* are not necessarily alternatives or solutions to overflowing bookstacks.

Cooperative undertakings among librarians are (we say) nothing new at all. Interlibrary loan activity has always functioned in network fashion amongst librarians, with extension of local self-sufficiency to include other collections, and the extension of sharing as a concept of access.[1] The metamorphosis from cooperation to networks seems to rest upon 1) formalization and planning and, 2) the inferred application of new mechanics and techniques, rather than increased amounts of old procedures and traffic. With respect to formalization, the objectives of a network must be selected and identified specifically and carefully, and based upon acknowledged and solvable needs. To be considered are: subject areas, physical format and content; restrictions such as language, existing resource inventories, supplemental resources required, and channels of communication; assignment of responsibilities; standardization and compatibility of records and procedures; cost determination and allocation; and many other organizational factors. With respect to new techniques, the influence of systems analysis techniques and particularly the availability and future potential of computerization and communication developments should be noted.

The forces working toward formalized cooperation have been many and powerful.[2] The impact of the so-called explosion in knowledge and resultant publications has made clear the impossibility of local self-sufficiency in meeting demands for information. Such demands have also been intensified by the expansion of educational programs and facilities, the growing consciousness that information is indeed a necessary base to progress and understanding in all fields of human activity, and the thrust toward intellectual freedom and the inherent right of each individual to the full development of his capacities.[3] Recognition of these various factors has been achieved in varying degrees at various local and national levels; provision of public funds has encouraged and enabled the planning and implementation of many library and information-related programs. Through them, it is hoped, access to information records will be assured and the economic burden shared through assessments and the tax base.

Of pitfalls there are many, and an illustrative few may bear mentioning. Provisions of the Higher Education Act, Title II-A, give preference to libraries engaged in cooperative undertakings. As might be expected, eagerness for funds has generated at least a few poorly

considered consortia and other hasty arrangements.[4] Then, too, cooperation does not preserve the existing components but changes them, more or less irreversibly. As one or more participants discontinue collecting in certain subject areas, the resource collections are built up, receive more use, and access may even be diminished.[5]

The emergence of structures for coordinated action has been examined in a number of conferences.[6] Initially, action has occurred within groups of similar libraries—small colleges, large universities and small public libraries. As planning proceeds, the barriers between types of libraries are hopefully surmounted, with a regional cohesiveness that recognizes the universality of human interest and inquiry and of the basic information record. Numerous examples of each level of enterprise may be enumerated. Among academic libraries the achievements include union catalogs and lists of serials, non-duplicating acquisitions agreements, open-door mutual privileges for faculties and students, common research centers, and centralized processing. Typical groups include the Associated Colleges of the Midwest, Associated Mid-Florida Colleges, the Tri-State College Cooperative and the Claremont Colleges.[7] In New Jersey, ten state colleges and universities formed a Council of New Jersey State College and University Librarians to cooperate in the planning and acquisition of grant money, and the sharing of resources.[8] The Ohio College Library Center will coordinate the library resources of fifty-one potential college members, public and private, based on a computerized processing center, shared cataloging and resource materials, with faculties given access to all member libraries.[9] Within bounds of a single discipline, ten small Pennsylvania college libraries have each accepted responsibility for acquisitions in a different area of biology.[10] At the university level, the five New England state university libraries are building their NELINET on a central computerized processing center,[11] and New York has its Five Associated University Libraries (FAUL: Cornell, Syracuse, Rochester, SUNY/Buffalo, SUNY/Binghamton).[12]

In the realm of public libraries, recognition has been given to the fact that small groups of individuals have the same potential interest range as large groups, and that each person should have full and convenient access to a total information panoply through the "seamless web of library service."[13] A vast amount of planning has occurred, much of it through support of the Library Services and Construction Act, Title III, and centered on coordination and funding of systems of libraries within the states. A bibliographic survey, 1956-1967, dis-

closed 132 published surveys, excluding those formulated as annual reports to the Office of Education.[14] Querying 159 systems identified in the *American Library Directory,* 24th ed., 1964, Nelson Associates received 491 replies on which to base its study of effectiveness. From this mass of data on many cooperative activities was deduced a need for further information on such specifics as unit costs, audiences served, and the real value to the ultimate users.[15] One estimate suggests that more books have become available in many small libraries, that there has been some increase in interlibrary loans, and that improved staff work has occurred in a few libraries.[16]

Where funds have been made available, systems planning and formation have thrived, with varying degrees of success and much gained in experience. While many states can point to functioning combinations of arrangements, the most extensive infusion has probably occurred in New York State.[17] Following passage of enabling legislation in 1958, twenty-two public library systems eventually came into being (including 700 of 725 public libraries in the state). The next step came about in 1966, when a governor's conference on libraries brought about the budgeting of $700,000 to provide for reference and research library resource systems (3R's). Nine such systems, representing, governed by, and drawing upon the research resources libraries of the respective regions have been set up, with services and cooperative programs of varying types ranging from centralized reference and referral operations to delivery of library materials. Two network activities were evolved for the state as a whole. The NYSILL (New York State interlibrary loans) program, tied together by TWX, included public, academic and special research libraries, using the state library as a focus and referral center. Three geographic referral centers received requests unfilled by the state library, channeling as appropriate to nine specialized subject referral libraries. Over 40,000 requests were handled in an eight-month monitoring period, and 87,000 in a subsequent operating period. Critical findings of two evaluative surveys dealt with relatively high costs (reduced from $15.80 to $10.82 per transaction) and slow delivery (nineteen days overall).[18]

The second network trial under the 3R's program was FACTS (Facsimile Transmission System). Fourteen major libraries were linked for transfer of needed documents, six having both receiving and transmitting equipment and the remaining eight receiving sets only. Cost, quality of transmission, and imperfect utilization of such

a system brought this trial to a close, as has occurred in similar experiments elsewhere.[19]

Of the nine reference and research library agencies chartered under the New York 3R's legislation, the largest and most publicized has been METRO—the New York Metropolitan Reference and Research Library Agency, centered at the New York Public Library. With a number of proposals in its future, those relating specifically to shared resources include cooperative acquisition of little-used research materials, cooperative storage, referral to other appropriate information and document sources, and a delivery system. Some fifty members with 400 library outlets constitute the METRO organization.[20] One thorough-going study in the area of science technology has been sponsored, with resulting recommendations for resource sharing and strengthening by various means.[21]

Moving now to networks formed on other bases, it is to be noted that subject disciplines (rather than geographic groupings) have also served as the common parameter. Again, New York State provides an outstanding example—the SUNY Biomedical Communication Network. Fifteen libraries participate, including various medical center and SUNY libraries, as well as the Countway Library of Harvard Medical School and the National Library of Medicine (NLM) in Bethesda, Maryland. A computerized data base includes book catalog records for three of the SUNY medical libraries starting with 1962, NLM book catalog records starting with 1966, article indexing records of the NLM's MEDLARS file, and holdings records for the journals indexed by *Index Medicus* from the *New York State Union List of Serials* file for network members. From remote terminals the user can identify the existence of literature satisfying his need and locate copies of specific documents. This impressive facility entailed development costs exceeding one million dollars (borne primarily by New York State), and has an annual operating cost of approximately $600,000.[22]

On the national scene, the National Library of Medicine has produced a biomedical communications network featuring a number of elements funded by the Medical Library Assistance Act of 1965 (extended, 1969). Bearing directly on the provision of needed publications not locally available is the network of eleven regional medical libraries. Serving specific geographic regions, these libraries act as backup resources to local facilities and as referral centers to other regions and to NLM. Books are loaned and photocopies of articles are

delivered (at no cost to the user) when not found in local resources.[23] The eleven-member ARLO (Art Research Libraries of Ohio) envisioned a program of planned acquisitions, work on a union list, and collections freely shared with each other.[24] Following an original proposal in 1967,[25] an agricultural information network was still being called for in 1970, with revamped plans drawn by EDUCOM.[26]

In one sense, EDUCOM (Interuniversity Communications Council) might be termed discipline-based, if pedagogy is admissible. Principally motivated toward a system of interconnected and powerful computer centers, EDUCOM hoped to provide its member universities throughout the United States with access to data banks and computing facilities. Its project EDUNET was to be an information network of advanced design, some part of which would provide textual access (at first digital, later by image) to the decentralized resources of the information record.[27]

The eventual place and necessity of nationally conceived networks of libraries is recognized, though progress in such thinking has been gradual and no "master plan" has yet been approached (let alone agreed upon). During the 1950s and early 1960s, the communication of information was the concern of several presidential panels, though their horizon was limited largely to government agencies and their focus was on science and technology. The "information problem" came to be seen as a complex of information processing and of document dissemination. Since the second factor is more amenable to systems design, modeling, and administration (and certainly to conceptual grasp), the COSATI report of 1965 was issued for study and reaction.[28] In essence, dissemination of information and documents was to center on designated agencies appropriate to various scientific disciplines—including some libraries. The reaction of the library community was, at most, lukewarm; limitation to scientific output and lack of recognition of any large-dimension solution were felt to be serious shortcomings.

But the profession brought forth no detailed blueprint of its own. Rather, its appointive committee tried to highlight a few particulars: the total problem was national, not federal; an essential provision was intellectual access—the determination that needed information exists, in some location; a second essential provision was physical access—delivery of the record to the user by an unspecified mechanism built on established and shared resources; and, since specification of details lay beyond presently existing capabilities, the establishment of a national

commission or body with authority, funding and expertise to attack the problem with necessary vigor and on a comprehensive front.[29]

Meanwhile, the National Advisory Commission on Libraries (NACL), having duly listened to many proponents and exponents, formulated its report to the president. It, too, emphasized the urgency of physical access. Recognizing the known interchange of materials and the reliance on resource collections, it noted the high cost to lending libraries and the slowness of transfer. "It is apparent that national, regional and state planning is needed to facilitate physical access to publications generally, utilizing any technological aids that it is feasible to employ." [30] In its recommendations to the NACL, the American Council of Learned Societies called for "the creation of a coherent national system of research libraries, minimizing unnecessary duplication, fostering cooperative efforts, and ensuring the freest possible access, consistent with local needs, to the resources of all libraries and archives embraced by the system." [31] Finally, the Committee on Scientific and Technical Communication (SATCOM) included a recommendation in its 1969 report (buried deep amidst more far-ranging thinking) for support of "research-library services, with emphasis on start-up costs for innovative services," noting that "such services may and usually should cut across institutional lines and involve the concept of networks and the cooperative use of library resources." [32]

In the 1968 amendment to the Higher Education Act, a new Title VIII offered much promise toward "Networks for Knowledge." Funding was authorized for programs of acquisition designed for sharing and joint use, for giving access through interinstitutional catalogs and through efficient and effective systems for transmission. In such respects, it goes beyond the interlibrary cooperation enabled under LSCA Title III.[33] But, by mid-1970 funds had yet to be appropriated under the HEA title.

There has thus been much expression of urgent need and deep belief in the high councils of the land. Were national networks to evolve, what form would they take? In the present context, how can needed documents be shared, transported from repository to user (transporting user to repository having some limitations)? Our present channels of interlibrary loan are progressing, from book post to United Parcel Service to library systems trucks to commuter airline routes. Use of photocopies in lieu of loan has been customary for economically short documents or sections. Through special funding or mutual agree-

ments, copying is often provided at no user charge. The Medusa-head of copyright difficulties lifts at each mention of this device of resource sharing, but doubtless some equitable balances will be achieved. The facilities which we hope we see approaching employ electronic communication and the application of computer power and automaton servanthood.

Presently, teletype (TWX, Telex) links hundreds (possibly thousands) of libraries, using both commercial and leased lines.[34] While its messages are almost wholly inquiry and acknowledgment, some textual transmission occurs in most installations when transmission time is minimized. Its mechanical nature of operation does not and probably will not serve, even with high speed tape operation, as a principal medium for document transmission. The promise of facsimile transmission of entire pages has been held up to us, and numerous trials made over long and short distances. Depending upon the sophistication of equipment and character of cable or telephone line used, the print quality varies from illegible to excellent. The costs, in nearly all cases, are such as to cool the ambition and temper the demand for immediate service. Nonetheless, the prospect is still there, with coming development of flat-bed scanners, improved telephone lines, microwave transmission, cathode-ray tube projection, satellite relays—indeed a limitless array of "someday" apparatus to speed the needed resource in one collection to a distant user.[35]

Teaming up computers with electronic transmission brings us to the limits of our present vision and sends us beyond to fantasies. The role of computers in aiding access to information now centers on the bibliographic, not the physical or document-transfer phase. Data bases are substantially limited to bibliographic citations, together with necessary surrogates (codes, indexing terms, locations, etc.) by which the existence and availability of an information record are determined. Most are batch-mode operations used for printouts and updates, but on-line facilities are becoming more numerous and even more are planned.[36] The groundwork for any highly computerized network requires the most extensive analysis—exceeding by far the not inconsiderable study needed for a simple, formalized conventionally geared coalition. A number of interesting approaches have been made, utilizing techniques of systems analysis and mathematical modeling, ranging from the relatively basic to the esoteric.[37]

Text input and storage for a computerized data base promise substantial obstacles. While the technology is readily available, the opti-

mum selection, character of text (i.e., color, illustrations, etc.), user communities, and many other characteristics must be weighed. To aid in this preliminary task, EDUCOM has published a substantial compilation of data already available, as well as results of some new studies.[38] However, the principal present barrier is cost. A recent estimate finds that the cost of keeping a book on the shelf is about 20¢ per year, or 2¢ per megabit for the average 10 million-bit book. Off-line storage in tape form increases the tab to $7.47 per megabit year—a multiplier of 373. Finally, on-line disc storage is $237 per megabit year, and our multiplier has reached 11,800, or, more fancifully, 1.18 x 10^4.[39] For any immediate solution to our current book storage difficulties, one would seem well advised not to wait for help by this means. The technique being developed by Project Intrex at M.I.T. appears, in some respects, more promising. Text retrieval utilizes computer selection and manipulation of images stored in microfiche form, then transmission to remote stations and projection on a viewing screen.[40]

The dimensions of the book storage problem, then, vary from rigid to flexible and from conventional to futuristically hazy. The yellow brick road of cooperation seems firm, familiar, and reasonably broad. As we establish the various branches and gradations, stretching to more distant regions, the earth moving and paving is ever more rigorous. Systems, by their very nature, can tend as much to cumbersome as to expedited operation. Resource planning and workable agreements are exceedingly difficult to negotiate and maintain, particularly at the levels of large research collections and in contexts where faculty, not librarians, may bend the final decisions. Cost analyses and reimbursement hold many pitfalls, and money may not solve all problems, despite our cultural training. The host of barriers is indeed all too well known. But the library network, conceived as a channel of access to information otherwise largely denied, has definite promise of assistance—but not total solution—for storage problems.

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