
The Utah Education Network: a collaborative model

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High-speed data communications networks are transforming the operations, services, and roles of libraries. While the installation of the physical network is often the focus of activity, the administrative and political issues are, in fact, fundamental. For libraries to participate in and influence the development of networks, building new partnerships has proven to be an effective strategy. This paper describes the use of this strategy in the development of the Utah Education Network. This participation is essential if libraries are to take full advantage of the technologies and to ensure that networks reflect the fundamental values of the profession.

The health sciences librarian promotes access to health information for all and creates and maintains conditions of freedom of inquiry, thought, and expression that facilitate health care decisions.

MLA's Code of Ethics for Health Sciences Librarianship

Libraries and society are being transformed as a result of the convergence of computing and telecommunications, and it is a time of extraordinary opportunity and responsibility. Both the popular press and professional literature are full of the promises of the "information superhighway." Although 500 television channels may not strictly enhance the quality of life, clearly, access to information, free from the constraints of time and location, will alter library services and roles radically. In the first years of this revolution, libraries already have demonstrated the value of new computer and communications technologies through the use of e-mail, listservs, remote access, digital fax, and electronic publications.

The extraordinary promise of these technologies is nearly matched by the pace and the scope of actual development. Network implementation efforts are underway, connecting homes, offices, institutions,

states, and even nations. Much of the current effort is focused on the physical network infrastructure—wire, fiber, servers, and communications devices. Weaving networks into a functional information environment constitutes a significant challenge. However, the difficulty of installing the physical network is dwarfed by the challenges of network administration, support, and services. It is in these areas that the future of libraries will be defined and promises of the technologies realized. Library participation and leadership in addressing these larger challenges is crucial to the future of librarianship and to ensuring that the fundamental values of the profession are reflected in this new information environment. This paper explores opportunities and strategies for libraries, based on experience gained in the development of the Utah Education Network (UEN).

BACKGROUND

While the information superhighway only recently has emerged on the national agenda, its foundations were laid more than twenty-five years ago. In 1969, the U.S. Department of Defense (DOD) began to explore network development, and the resulting AR-

PANET provided the test bed for development of protocols that are fundamental to the operation of networks today. The Transmission Control Protocol (TCP) and the Internet Protocol (IP), which are collectively referred to as TCP/IP, make it possible to send mail and files and access distant systems. The ARPANET was a highly successful research network, but access was limited primarily to the computer science community.

By 1981, the utility of the ARPANET was recognized, and, as a result, BITNET was established to offer network services to users without access to the ARPANET. Established as a cooperative network primarily providing e-mail, BITNET, based on an IBM mainframe protocol, made a major contribution to network development by expanding network services well beyond the ARPANET. It is well worth noting that one of the most popular network services, the listserv, was developed as a BITNET service.

In 1984, a major advance in network development occurred, almost as a byproduct of the National Science Foundation (NSF) supercomputer initiative. At various sites around the country, NSF established supercomputer centers that required high-speed network services to provide access for users at remote sites. The emerging NSFNET adopted TCP/IP as its communications protocol and became the high-speed network backbone for the country. The high speed and enhanced functionality of the NSFNET served as a magnet, attracting new users and interconnecting networks throughout the country and the world. The resulting network of networks became the Internet [1-2].

Attempts to describe the growth of the Internet are fast becoming clichés. As of early 1994, the Internet included an estimated 21,000 networks in sixty countries, connecting two million computers and providing access for fifteen million users. The monthly growth rate of the Internet is estimated at 7% to 10% [3].

This spectacular growth is a result, in part, of government programs encouraging continuing research in networks, supporting access, and fostering development of network services and resources. The High-Performance Computing and Communications (HPCC) program includes, as one of its five major components, development of the National Research and Education Network (NREN). The HPCC initiative focuses on increasing access to high-performance computing and fostering the development and application of networking technologies [4-5]. Complementing and in some ways supplanting the HPCC program, the National Information Infrastructure (NII) program extends networking beyond its traditional base in academia to larger education, social, and economic arenas, addressing development of network services and resources [6-7]. The alphabet soup

of agencies participating in these programs includes DOD, Department of Energy, NSF, National Aeronautics and Space Administration, and National Institutes of Health. In 1992, the National Coordinating Office for High-Performance Computing and Communications was established to coordinate the various initiatives. Donald A. B. Lindberg was selected to direct the office, in addition to his duties as director of the National Library of Medicine.

While significant activity is taking place at the national level, there are also major efforts underway at the state level. These initiatives are best characterized by their diversity. A wide variety of technologies are being explored, including wire, fiber, satellite, cable, Integrated Services Digital Network (ISDN), Frame Relay, and Asynchronous Transfer Mode (ATM). Some networks have a specific focus, such as supporting education, while others provide a broad array of services [8-10]. At this stage in the development of these networks, the major participants are institutions in higher education, public education, and state government, with the extent of participation varying from state to state. This is a highly dynamic environment, and much of the effort is breaking new ground and breaking down traditional barriers. The decisions now being made in the development of network services at all levels will directly impact the future of libraries. Librarians must bring their experience and professional values to these discussions and be prepared to participate and provide leadership in defining this new information environment.

NETWORK IMPLEMENTATION

The development of the UEN illustrates the forces at work in network implementation in general and of the opportunities and challenges for libraries. Computer networks have a long history in Utah, beginning at the University of Utah, when it became the fourth site on the ARPANET early in the 1970s. The university participated in the research that resulted in the TCP/IP protocols. Early in the 1980s, a low-speed network connected four of the academic institutions, and, in 1985, the university became one of the original nodes on the NSFNET. However, efforts to install a high-speed network connecting the colleges and universities were frustrated by politics and turf battles, two issues frequently encountered in network development. It is important to note that libraries were not represented in these early efforts nor were the emerging library systems considered in the discussions.

The first successful network initiative in Utah was a somewhat unexpected outcome of a statewide library study. By the mid-1980s, the college and university libraries in the state were severely overcrowded and had deteriorating facilities. Individually, the

libraries had been unsuccessful in finding funds for building within their own budgets. However, the college and university libraries in Utah have a long history of cooperation. In 1987, library officials decided the library facilities problem should be approached as a statewide initiative, and the legislature approved a request for funding.

The study was to be coordinated by the Commissioner's Office of the Utah System of Higher Education. The study was to address not only facilities but also technology and interlibrary cooperation. These last two issues were added in the hope that technology and interlibrary cooperation might provide alternatives to expensive new facilities. A successful building program was certainly paramount, but a particularly valuable outcome was the establishment of a direct relationship between the libraries and the Commissioner's Office.

The vast majority of the study effort was devoted to the facilities issues. The study was completed in 1989 and produced a report addressing technology [11]. While not particularly insightful, the report did legitimize the discussions of library systems and networking. At a meeting in the summer of 1989, library officials decided that a technology proposal should accompany the building proposal being prepared for the 1990 session of the legislature. The primary component of the technology proposal was installation of a library systems and data communications network that would link the colleges, universities, and the state library. Because development of the technical proposal for the network was beyond the skills of the librarians, a third partner, the University of Utah Computer Center (UUCC), joined the effort. With expertise in supporting campus networking and management of NSFNET access for the university, UUCC has provided invaluable technical support for the development of the network.

The network proposal sent to the legislature was justified on the basis of its capability to link library systems and enhance library cooperation. Clearly, the libraries realized that the network offered much more, but the justifications were based on services that would be comprehensible to the legislators and consistent with the recommendations of the statewide library study. Representatives from the libraries, the Commissioner's Office, and UUCC testified before the legislature in support of the network. The legislature approved the proposal for what was referred to as the "Utah Library Network," but only one-time funding was provided, with no assurance of ongoing support.

With the legislative success, it was crucial to establish links with the systems administrators at each college and university. These administrators meet quarterly as the Administrative Data Processing Advisory Committee (ADPAC), and, thanks to the as-

sistance of the Commissioner's Office and UUCC, a library representative was invited to attend ADPAC meetings. The initial meetings were somewhat awkward. ADPAC was aware of the network initiative and basically welcomed it, but there was some uncertainty as to why libraries were interested in the network and some discomfort with the fact that it was a library initiative. However, with a little patience on the part of everyone concerned, a level of confidence emerged, and a very productive partnership developed that led to implementation of the first network connecting all the institutions in higher education in less than a year. Moreover, significant savings were realized in the installation, making it possible to stretch the one-time funding for two years and cover telecommunications charges and fees. All other costs were absorbed by the institutions.

An interesting opportunity to extend the network coalition grew out of the Utah Governor's Conference on Libraries, held early in 1991. The conference identified various statewide priorities for libraries, including examining public library participation in the Utah Library Network. The state librarian, as a member of the Council of Academic Library Directors, was familiar with the success of the network. Representatives from the network coalition and the public library community worked with the state librarian to develop a network planning proposal, which was submitted for the 1992 legislative session. A representative from the academic libraries testified in support of the proposal, describing the progress of the network and demonstrating a new level of cooperation between the public and academic libraries.

The proposal was approved. Funding was provided for the development of a plan for public library networking and the installation of model sites. The session also proved to be successful for academic libraries, with funding provided for the installation of Ariel® workstations at each of the college and university libraries. These workstations, consisting of a microcomputer, scanner, and laser printer, support digital fax services for document delivery.

Following the legislative session, discussions began with a major new partner—public education. For the previous two years, public education had been involved in a \$60 million Educational Technology Initiative. This initiative focused on placing microcomputers in the classroom, with the objective of enhancing both quality and productivity in public education. "Early adopters" in public education had begun exploring services and resources provided by the Utah Library Network. In developing strategies for the support for the network, it was assumed that public education ultimately would participate in the network, and this would be especially valuable in seeking ongoing funding. The principal challenge was to identify a mechanism for this participation

that would overcome the traditional boundaries between higher education and public education.

As it turned out, a straightforward solution emerged. Instructional Media Services (IMS) at the University of Utah is responsible for the public radio and television stations. It is also responsible for the Utah EDNET, a microwave network providing educational television services to public schools that receives support directly from the public education budget. With its neutral status, IMS was the ideal mechanism for public education participation in the network except that IMS had limited expertise in data communications and networking. The partners in the Library Network initiated discussions with IMS to explore its potential for providing network services and resources. This collaboration resulted in the development of a \$4 million proposal to extend network services to high schools. The proposal was submitted to the 1993 session of the legislature.

By this time, network development was booming, with network initiatives underway in public education, higher education, and public libraries. These efforts were all the result of significant cooperation and collaboration across traditional administrative boundaries. Although this approach had been successful, it was anticipated that as the various proposals were considered by the legislature, the inevitable question of who was in charge would be raised. In fact, it was probably appropriate to bring some structure to the process, but the structure would have to enhance the successful collaboration that had been the foundation of the network.

A proposal was developed to reconstitute the EDNET as the Utah Education Network, which would report to the board of regents, the governing body for higher education. The activities of the UEN would be coordinated by a broad-based Steering Committee. Two additional committees also were proposed: the Library and Data Communications Committee and the Instructional Television and Video Services Committee. The proposal was adopted by the board of regents just as the legislative session was beginning. Libraries are represented on the Steering Committee and on the Library and Data Communications Committee. Again, numerous presentations were made before legislative committees, with successful results for all of the initiatives; particularly notable was full funding for the UEN.

The new organizational structure also provided the basis for extending the coalition to include the State Division of Information Technology Services. The division is responsible for providing computing services to state government, primarily in the context of mainframe computing. Although the division is not entirely comfortable with the decentralized activities of the network, efforts are being made to cultivate cooperative working relationships.

Finally, luck has played a significant role in the recent development of the network. In 1993, the state's new governor strongly endorsed the creation of an "electronic highway" for the state. Representatives from the governor's office are now members of the UEN Steering Committee and the Library and Data Communications Committee.

STRATEGIES AND OPPORTUNITIES

The basic strategy in the implementation of the UEN was collaboration. A number of factors influenced the development of this strategy. The libraries have a long history of cooperation, which provided the initial linkages among institutions. While the network began as a library initiative, the libraries recognized that they lacked the technical and political expertise to sustain the effort. The Office of the Commissioner and the UUCS were the first partners. Another reason for the collaboration was that no entity had the resources to develop the network on its own. At virtually every step, resources were leveraged.

In retrospect, no one fully anticipated the technical, social, and political complexity of network development. The network, potentially, will affect every citizen of the state. The collaborative strategy resulted in equal participation, with all parties contributing expertise. It is hard to imagine how a closed process could achieve the full potential of a network.

Libraries bring important assets to a network implementation project, regardless of whether it is a local-area network, a state network, or a national network. Certainly, libraries constitute an extremely valuable and comprehensible resource. From the time of the earliest discussions of networks, libraries repeatedly have been identified as examples of important resources that could be made available via a network. At a relatively early point in the development of the UEN, an interesting discussion took place between a librarian and a senior representative of the telephone company. Basically, the question was, who should pay whom? Should a library pay the telephone company to have access to the network, or should the telephone company pay the library for access to its resources?

Much of the current focus in network development is on the physical infrastructure and making it work. While this is certainly not a trivial task, the value of the network will rest with the services it provides. Libraries have more than twenty years of experience working with patrons, attempting to effectively utilize the resources in complex electronic environments. The skills and tools that have been developed to assist patrons clearly can be extended to the new network environment. The classes and workshops presented by libraries on the Internet are excellent examples. Another area of library expertise that can

be transferred to this new environment is selection and organization of resources. There may be no greater immediate challenge than providing organized access to the proliferation of resources and services on networks. Various clever technologies may assist in this process, but libraries now are taking on this extraordinary challenge.

Libraries can justify their participation in network development not only on the basis of resources and expertise but, also and possibly more importantly, on the basis of their professional values. During this period of network development, critical decisions are being made and policies developed that will guide the future of networks. At the very first meeting of the UEN Library and Data Communications Committee, a question was raised about what we will do when a student in a small town brings up an obscene picture on a computer monitor. What constitutes acceptable use of the network? Is the right to privacy sacrificed by network monitoring necessary to protect the network from disruption? Who should have access, and what constitutes grounds for denying access? These are complicated issues, but the values of intellectual freedom and the rights of access to information must be represented in these discussions, and libraries are in an ideal position to do this. (The UEN policies are listed on the University of Utah gopher.)

CONCLUSION

At various times in the development of the UEN, people have asked why we were diverting resources from books and journals to a network. The response at the time was that the network was an investment in the future of libraries, and this has proven to be true. The collaborative development of the UEN illustrates both a development strategy and a principal strength of a network environment. The network is an extremely powerful and democratic information environment. Libraries have significant contributions to make in the continued development of this environment and the responsibility to ensure that it reflects the fundamental values of the profession.

REFERENCES

1. ARMS CR. A new information infrastructure. Online 1990 Sep;14(5):15-22.
2. LANE ES, SUMMERHILL C. Internet primer for information professionals: a basic guide to Internet networking technology. Westport, CT: Meckler, 1993.
3. Interview: Vinton Cerf. Computerworld 1994 Jan;28(6):121-2.
4. FEDERAL COORDINATING COUNCIL FOR SCIENCE, ENGINEERING, AND TECHNOLOGY. COMMITTEE ON PHYSICAL, MATHEMATICAL, AND ENGINEERING SCIENCES. Grand challenges 1993: high performance computing and communications. Washington, DC: Office of Science and Technology Policy, 1993.
5. FEDERAL COORDINATING COUNCIL FOR SCIENCE, ENGINEERING, AND TECHNOLOGY. COMMITTEE ON PHYSICAL, MATHEMATICAL, AND ENGINEERING SCIENCES. High performance computing and communications: towards a national information infrastructure: a report. Washington, DC: Office of Science and Technology Policy, 1994.
6. GORE A. The information infrastructure and technology act. EDUCOM Rev 1992 Sep/Oct;27(5):26-9.
7. UNITED STATES EXECUTIVE OFFICE OF THE PRESIDENT. INFORMATION INFRASTRUCTURE TASK FORCE. The national information infrastructure: agenda for action. Washington, DC: The Task Force, 1993.
8. HAWKS CP. The integrated library system of the 1990s: the OhioLINK experience. Libr Res Tech Serv 1992 Mar;36(1):61-77.
9. MECHLING J. A state-level view of information infrastructure: aligning process with substance. In: Kahin B, ed. Building information infrastructure: issues in the development of the National Research and Education Network. New York: McGraw-Hill Primus, 1992:31-45.
10. WESTERN INTERSTATE COMMISSION FOR HIGHER EDUCATION. Reports from western states: educational telecommunications plans, policies, programs. Boulder, CO: The Commission, 1991.
11. Plans and recommendations regarding facilities, inter-library cooperation, and technology from a Utah statewide library study. Salt Lake City: RMG Consultants and the State of Utah, 1989.

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