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Electronic Mail Services in the Library and Information Center Community

In the beginning, libraries were not leaders in the use of new technology. Upon graduation from library school twelve years ago, a new professional had the experience of not being able to find a job because his combination of computer programming and library science did not match any of the scores of job descriptions within the library community of a very large North American urban center. Two universities, four community colleges, seven public library systems, and scores of special libraries in various corporate headquarters had a minimal need for computer or technological expertise, although virtually all of these institutions were aware of the burgeoning information explosion and were participating in an active continuing education program from a well-reputed library school. Many organizations were planning for or at least thinking about the impact of technology in what was then being described as the "information age" in visionary articles in the professional literature, and several were beginning to commit resources to automation, at least in their planning budgets.

Today all of those institutions are using computers for a variety of library tasks and most of them have at least one or more people responsible for introducing new technology into the library environment. These library systems are in Toronto, a city endowed with one of the highest per capita expenditures for library services in the continent. The graduate was the author. Where just a few years ago there were no opportunities for the technologically-oriented graduate, there are now openings in every kind of library.

This anecdote underscores two key points—the rate of introduction of new technology into the library community has been very high, and the

process of introducing new technologies is extremely dynamic. What library today does not have access to machine-readable cataloging, online reference services, automated acquisitions or circulation control systems? Literally every participant in this Clinic comes from an institution that has access to one or more of these services.

Within the last fifteen years the library and information center community has pioneered the implementation of several new technologies. Bibliographic utilities and online reference services are two examples of large-scale, state-of-the-art computer systems that have been designed and implemented expressly for library and information center use. A few years ago a close friend who was then developing new systems for Tandem Computers mentioned his extreme surprise at the scale and sophistication of OCLC's application requirements. Like many people in high-technology industries he was surprised that libraries could innovate and that the applications that were being implemented were on such a large scale. The low-profile and quasi-public image that libraries traditionally project is not in harmony with technological pioneers at the forefront of the information sector.

Early Use of Telecommunications in Libraries

And yet, there are communities that implemented online circulation systems before local banks or retailers had automated their systems. Telecommunications applications are equally prevalent within the library and information center community. Dedicated communications lines to bibliographic utilities and local systems are common. Dial-up access to online reference services is so successful that many new companies have been started and the number of services and databases available is growing rapidly. New companies are providing research and information brokerage services, both augmenting and replacing traditional library services.

When Fred Kilgour was establishing the concept of a bibliographic utility and a public Dialog system was still a gleam in Roger Summit's eye, the most advanced technology most libraries were using was the typewriter, the photocopy machine, and in Canada (as constant as the staff lounge and gossip), the electric tea kettle. Well-endowed central branches and reference collections might have had microfilm or microfiche collections, and some universities were experimenting with computer-based systems. Most of the automated library systems then in use were off-line, batch-processing, punch-card based systems.

The early use of telecommunications in libraries was largely limited to TWX machines in dedicated networks and interlibrary loan applications. Although by no means universal, many libraries had access to a main branch or cooperative system that would send interlibrary loan queries to

other institutions. It was sometimes necessary to mail the requests to a central branch or regional center after they had been thoroughly documented from the originating library's local bibliographic resources. The regional center would then route the request to various resource centers using the TWX network. One and a half decades ago, this was the only form of telecommunications that most libraries were using.

A Short History of Electronic Mail

It is important to establish our perspective on electronic mail in a historical context. Telex and TWX services are a direct derivation of the telegraph. On 24 May 1844, Samuel Morse demonstrated to members of the U.S. Congress and a gathering of officials and friends the first public telegram transmission, inaugurating a new age of communication technology. The first electronic message consisted of the quotation: "What Hath God Wrought!"—a quotation from the Book of Numbers chapter 23, verse 23, secretly selected for the occasion by Annie Ellsworth, daughter of the U.S. Patent Commissioner. This auspicious choice of quotation has been underscored by Joe Ford in his keynote address to this conference. Other speakers at this Clinic have described efforts to establish control over vital telecommunications technology. As we wrestle with telecommunications complexity and the numerous choices we must make, especially in this era of deregulation and technological change, it is sobering to realize that in the middle of the last century Samuel Morse could not find a buyer for his invention because there was no commercial market application.

Today, 140 years later, electronically communicated messages and information are an integral part of world civilization. The synergistic interaction of computers and electronic communication create an environment in which virtually any kind of information transfer is possible. The increasing importance of electronic communications to individuals and organizations has resulted in thousands of companies, services, products, and options for electronic mail and messaging. However, this explosion of choice has also resulted in confusion, incongruency and unconnectedness. This twentieth-century tower of electronic Babel is both boon and bane, sometimes a channel but often a barrier to effective library communication.

John Kountz has described the basic elements of the telegraph with his illustration of brother Tom at the backhouse and a coded signal over an electric wire. Using special wires strung between public offices, telegraph technology revolutionized commerce, journalism, warfare, and human perspective. The telegraph was the first tenuous copper wire through the global village.

In the United States, Western Union became a quasi-utility, sharing with the U.S. Postal Service an official mandate to deliver mail. In most other countries telegraph services were subsumed as part of the PTT, the official government department with monopoly control over post, telephone and telegraph facilities for that country.

As electro-mechanical technology was developed during the last century it gradually became possible to provide customers with dedicated machines with a unique number (or address) and to route calls through a switching center. Messages could then be electronically delivered directly to recipients equipped with their own telex machine. Telex is still the most common form of electronic mail, with over 3 million machines and numbers installed worldwide.

Using the five-level baudot code and operating at 6.6 characters per second in uppercase letters, the reliable telex machine can be found in virtually every country and continues to be a mainstay of business communications. The power of the telex is the worldwide availability and accessibility of the technology and service, combined with a high degree of reliability.

The maturation of the more sophisticated 7-bit code known as ASCII (American Standard Code for Information Interchange) enabled the transmission of a more extensive set of characters, including lowercase letters and special symbols. TWX service was introduced by AT&T shortly after World War II. TWX machines, also called teletypes, teletypewriters (or TTY), are still a common form of electronic mail in the United States. TWX service is available only in the United States and Canada.

Although TWX machines have a larger character set than telex machines, they still operate at relatively slow speeds—about 10 characters per second—and require a dedicated line. In recent years, Western Union and other international record carriers have made it possible for volume customers to access the telex and TWX services at higher speeds and in a dial-up mode through voice-grade telephone lines, although users are still charged for the delivery of messages at the slower network speed.

In addition to becoming a domestic U.S. communications standard, ASCII TTY communications protocols were adopted for computer communication by most major computer companies except IBM. ASCII comunication codes were adopted as an ad hoc standard for general-purpose, dial-up terminal access. Today there are other, more specialized and higher-speed protocols and technologies for computer communications, but ASCII remains a basic standard for a wide range of computer and electronic mail services.

When computer operating systems that could execute several programs simultaneously were developed and it became possible for several user jobs to time-share the same computer system resources, it also became

necessary for the various jobs (users) to communicate with the central console (operator), to request tape loads and other special handling. When systems began supporting several users at remote locations—particularly end users involved in interactive applications—the operating systems were enhanced to enable the users at remote sites to type and exchange general-purpose messages with the console operator.

But if a user could send messages to the computer operator, why not to other system users? Many time-sharing services and large operating systems evolved primitive messaging capabilities that enabled users to talk directly with other users or leave messages in a mailbox for a recipient to read at their convenience. These services became quite diverse in their operating characteristics and capabilities, but their utility led to the development of other, more sophisticated electronic mail services.

Computer-Based Message Systems (CBMS), have become so specialized that entire computers are now devoted to the electronic mail application. No longer competing for resources on large general-purpose mainframe computers with many different applications, CBMS and the electronic mail applications they support have become a new industry, blending computer and telecommunications technology in ways that impact modern society and its institutions, including libraries.

Electronic Mail in Libraries

In the library context, electronic mail and messaging services are becoming more prevalent in a variety of ways. The bibliographic utilities have moved closer to electronic messaging through the implementation of interlibrary loan subsystems. Originally limited to shared-cataloging applications, bibliographic utilities have been pressured to provide more functional capability, and interlibrary-loan messaging systems have been a natural result.

The trend toward increasing generalization and functionality of the systems we use has been referred to by previous speakers. This has been the case with online circulation and reference services as well as with bibliographic utilities, systems for other vertical markets, and personal computers. When users become familiar and comfortable with the systems they are using, they inevitably want more general-purpose capabilities. Rising user expectations should not be a surprise to the participants in this Clinic.

In the last few years there have been many developments in the application and implementation of electronic mail services in the library and information center community. Experiments with Telemail and Comet and the American Library Association's ALANET—implemented with the ITT/Dialcom service—are examples. Several months ago Roger Summit announced that Dialog was developing a general-purpose electronic mail system (EMS), as well as a private packet-switched network.

The CLASS OnTyme Network

In 1980, CLASS (the Cooperative Library Agency for Systems and Services) began receiving requests from the special library community for an electronic mail capability that could be used to exchange ILL data with other special libraries. Unlike public and academic libraries, these institutions were not traditionally included in dedicated TWX networks and many are not users of bibliographic utilities.

CLASS is a multitype membership-based library network operating under a mandate to achieve complete cost-recovery within five years of its inception. It was therefore important for the organization to examine and implement new services that could be used cost-effectively by any library. Electronic mail was an excellent opportunity to diversify the range of services being provided to members.

A cursory review of potential systems revealed the wide range of possible options that were available for EMS in the library community. It was necessary to select a service based on some rational subset of desirable features. There were several criteria used to select an EMS service for resale:

1. *Cost.* Most libraries have limited budgets. The cost had to be as low as possible and commensurate with good service and capability levels. It was vital that the service be as inexpensive as possible and also widely available, preferably through a local telephone call and a packet-switched network.
2. *Capability.* Although the specific application was for interlibrary loan data, an electronic mail service should be general enough to accommodate other kinds of applications, including the transmission of reference questions, contract negotiations, and committee reports. The system had to be effective with any kind of textual data.
3. *Flexibility.* It is important that an electronic mail system be responsive to changing user requirements. It should be possible either for the user or for the service supplier to alter the features and characteristics of a system that is intended for general communications. OnTyme was selected partly because it was a new product and the company personnel evinced a willingness to make the changes and enhancements their users wanted.

A closer examination of the service alternatives included demonstrations, cost-comparisons and negotiation with prospective vendors. Several options were immediately excluded because of cost and time factors. It was not practical to obtain a dedicated computer facility or to implement the EMS application on the CLASS minicomputer system. The OnTyme service from Tymshare was selected because it met the primary selection criteria and the company was interested in working with the library

application and a resale agency. CLASS and Tymshare were geographically close and personal communication was relatively easy. OnTyme was a new product that had not proven itself and was originally the responsibility of Tymnet, the Tymshare subsidiary that operates the packet-switched network.

Within a few months CLASS had established the first general-purpose EMS network for libraries and was meeting the requirements of the special libraries that had requested the service. CLASS became the first organization to resell electronic mail and acted as a secondary value-added network. Public libraries began to replace more costly dedicated TWX networks.

One of the most interesting aspects of managing the electronic mail network was the discovery of applications that were completely different from those originally intended. Information brokers began to use the service to communicate both with their customers and with their stringers and researchers at remote locations. Book jobbers began to use the system to accept and acknowledge orders. Publishers began to use the service to receive copy from authors and editors. Professional associations began to use the service to transact association business electronically, avoiding the time constraints and costs of using the post office and playing telephone tag.

Another interesting consequence of the introduction of electronic mail was third-party resale of CLASS OnTyme. First the Pacific Northwest Bibliographic Center (PNBC) and then the Bibliographic Center for Research (BCR) began to resell OnTyme services originally provided through CLASS, becoming in effect, tertiary value added networks.

Other speakers at this Clinic have mentioned the critical role that telecommunications play in the library and information center context. Electronic mail is not yet a complete replacement of the telephone, regular mail, telex or other forms of communication. But electronic mail can be an effective alternative for traditional communications, and can be a powerful tool in time and information sensitive applications.

Videoconferencing, interactive computer conferencing and the telephone are communication technologies that, along with electronic mail, will continue to influence the way in which we organize our work and deliver our services.