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Information Technology and Libraries

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Enhancing the Processing Environment: The Development of a Technical Services Workstation

Richard Entlich, William Fenwick, and Dongming Zhang

Although automation had an early impact on technical services operations, the rate of progress has been slow. Recently there has been a great deal of professional interest in the concept of a "cataloger's workstation," a customized configuration of hardware and software designed to enhance the processing environment. A project was undertaken by the staff in the Albert R. Mann Library to design and implement a technical services workstation (TSW) for cataloging and acquisitions staff. Using inexpensive and readily available products, the project showed that microcomputers can provide significant benefits for processing staff. Technical Services staff have only begun to exploit the power of microcomputers, however, and new developments in computing and networking will have a significant impact on the technical services workstation of the future.

At many libraries, automation came to technical services before it came to any other division. Beginning with the specification of the MARC record in 1968, followed by the creation of the bibliographic utilities and the implementation of local online cataloging and acquisitions systems, automation has had a profound impact on the conduct of technical services work.

In some respects, however, the rate of progress in automated systems has been slower in technical services than in library departments that automated much later. For many staff, automation of technical services has meant primarily that cataloging records are stored and created in an online environment, using a terminal instead of a typewriter.

Recently, the ultimate promise of the benefits from automation for technical services has been embodied in the concept of the "cataloger's workstation," a customized configuration of hardware and software designed to vastly simplify the life of original and copy cataloger alike. It has partial parallels in other areas of library operations in which the microcomputer has been used to soften or completely replace rigid mainframe environments. Examples include pre- and postprocessing software for online searching and CD-ROM search stations.

Unfortunately, much of the promise of the cataloger's workstation remains undelivered. Although general-purpose microcomputers are increasingly replacing dedicated terminals on technical services desks, staff continue to be underserved by the power and flexibility of the microcomputer. This is particularly true in large research libraries that still rely heavily on mainframe-based online catalogs such as NOTIS and on the bibliographic utilities. However, it is not necessary for the cataloger's workstation to emerge fully formed from the laboratory before technical services staff can

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enjoy more of the benefits that microcomputers have brought to other departments. Microcomputers can offer relief from some of the more tedious and burdensome mechanical aspects of technical services work right now, using inexpensive and primarily off-the-shelf products.

What follows is a description of the background and rationale for the development of Mann Library's technical services workstation and the details of the microcomputer-based enhancements provided to staff. A concluding section discusses the potential application of other existing and emerging technologies to simplify further the mechanical and intellectual aspects of technical services operations.

BACKGROUND

Mann Library is the land-grant library of New York, serving the colleges of Agriculture and Life Sciences, and Human Ecology, as well as the Divisions of Biological Sciences and Nutritional Sciences at Cornell University. The project described here is a joint effort of the Information Technology Section, consisting of 6.5 FTE staff providing systems development and technical support for staff and patrons, and the Technical Services Division, consisting of 16.5 FTE staff, who carry out acquisitions, cataloging, and serials tasks.

Those technical services staff who have worked at Mann since the early 1970s have witnessed and weathered four major shifts in the automated environment. Starting with OCLC in 1974, operations moved to RLIN I and II both in 1981, and to local processing with NOTIS in early 1988.

Particularly in the early days, staff tended to view the bibliographic utilities as primarily "a big electric typewriter in the sky" rather than as a major database resource. Even at that, staff had to tolerate proprietary keyboards, displays, and printers in order to utilize the ALA character set.[1,2] Other problems included RLIN I's use of non-MARC variable-length field tags and RLIN II's initially slow response time. In addition, access to RLIN was via expensive, single-purpose hardware and leased communications lines. Nevertheless, the benefits derived by the entire library community from contributing to the shared OCLC and RLIN databases largely overshadowed the technical difficulties encountered in using the systems. Member libraries tolerated the deficiencies for largely unselfish ends.

In the long run, a combined strategy of loading records in a local system and a national utility proved most advantageous to Cornell. Moving the library's records to NOTIS provided an online catalog, automated circulation, and other capabilities RLIN could not address. At the same time, tape loading to RLIN meant that Cornell's records would still be widely available. Following years of retrospective conversion work, NOTIS was installed universitywide in 1988. However, the decision about what hardware to purchase to replace dedicated RLIN terminals was left up to individual libraries.

Hardware selection in anticipation of NOTIS' arrival was made from mid- to late-1987, and conventional wisdom at the time suggested that any radical changes in end-user hardware for technical services staff be avoided. The need for IBM mainframe compatibility and, in particular, support of the ALA character set severely limited the choice of terminal devices. A few terminals that met the required specifications were available. They were fairly inexpensive and also fairly limited in capability.

The other option was microcomputers running terminal emulation software. These were already commonly used in public services for remote database searching, but technical services was still outfitted largely with typewriters, a few leased RLIN terminals, and several microcomputers. A few staff members used the microcomputers for word processing, statistical report generation from spreadsheets, and other applications. Today, Mann Library has well over 100 microcomputers for staff and patron use. But in 1987, even though Mann had already made a strong commitment to microcomputers by establishing one of the first library-based university microcomputer centers, the choice of microcomputers to replace all those typewriters seemed to many to be an expensive, risky, and not easily justified choice.

Most libraries at Cornell chose to purchase the IBM 3163 in a special configuration providing ALA character set support. At Mann, a long decision-making process first settled on microcomputers and then ultimately on a particular IBM PC-AT clone made by AST. The Macintosh was rejected at the time due to the small screen on the Mac Plus and SE and the

high price of the just-released Mac II, although the Macintosh would be a very attractive contender today.[3] At the time, it was difficult to justify the decision to purchase microcomputers with any more than a promise of future flexibility and functionality. It was not even certain how the relatively limited capability of the IBM 3163 was going to be replicated in the MS-DOS computing environment, let alone the much ballyhooed concept of a cataloger's workstation. What was known was that the IBM 3163 was an inflexible, single-purpose device and the AST was a general-purpose microcomputer with a lot of untapped potential for technical services applications.

There was also a legitimate question as to whether the expense of automation in technical services could be justified from a management perspective through increases in productivity and improvements in the quality of output. This issue has been raised frequently in the literature. Rogers and Hine, while surveying academic libraries on their use of automated workstations for professional catalogers, included questions about both the productivity and quality issues.[4,5] Matthews speculates that "the speed and ease with which computers could solve some of the problems experienced by catalogers, either wholly or in part, might result in positive influences on the overall quality of the cataloging done in any library."[6] Morris, and Thomas and Weston both refer to the as-yet unsubstantiated hope that automation of various aspects of technical services will free up staff resources that can be reallocated either within technical services or perhaps even to other sections of the library.[7,8]

There are several important assumptions underlying these ideas. The most fundamental is the notion that automation of technical services refers to a narrow range of functionality designed to assist in the searching, display, input, and editing of catalog records.[9] This feeds a second assumption that improvements in productivity and quality will result only from automation of technical services-specific tasks. In fact, technical services staff should benefit from a much wider concept of automation. In particular, communications facilities that improve the access staff have to network resources can be very useful. For instance, electronic mail facilities expand opportunities for communicating with coworkers and colleagues at other institutions, either person-to-person or via interest-specific distribution lists, such as the AUTOCAT listserv or ACQNET. Acquisitions staff can communicate directly with some vendors via the Internet. Thus, while it remains important to avoid automation as an end in itself, it may not be possible to measure all the benefits in a systematic fashion.

LIBRARY WORKSTATIONS

There is little agreement as to what constitutes a library workstation. Marmion describes one as "a microcomputer that is located within the library building and is either acquired from a vendor of library automation systems and software, or, if not from such a vendor, its primary purpose is to run the software marketed by one of these vendors."[10] Nelson is somewhat more expansive, suggesting that a library workstation can be "any workstation configuration, either an especially designed dumb terminal or one based in microcomputer technology, that is: (1) either developed and sold by a library services vendor for use with a particular automated system; or (2) specified as the minimum components required for use of that system and which may be independently assembled from off-the-shelf components. The workstation may or may not be hardwired to a larger computer, chained into a system of terminals, or include a modem."[11]

Much more generic and relevant to the work described here is the notion of a library workstation as "a pipeline for bringing in and manipulating information designed for the information professional."[12] When the workstation is a general-purpose microcomputer, there is no reason to constrain its definition in terms of a single vendor or function. This avoids the need to refer to a system capable of handling more than one function as "multipurpose."[13] A workstation that is a microcomputer should be considered multipurpose by its very nature. Otherwise the computer at its heart is being underutilized. We will refer to the customized microcomputer environment at Mann Library as simply a technical services workstation (TSW).

CATALOGER'S WORKSTATIONS

Most references in the literature to workstations for technical services work are to a "cataloger's workstation" and focus exclu-

sively on tasks traditionally performed only by catalogers and not by other technical services staff. Despite the narrow focus, there is little concurrence regarding what capabilities such a workstation should provide. Those who have published specifications (or projected specifications) agree only that a cataloger's workstation should do more than a dedicated terminal that provides access to a single bibliographic utility.

In its least ambitious form, a cataloger's workstation is simply a computer or terminal that allows input, editing, and display of catalog records and supports the ALA character set.[14,15] At the high end, "the ideal cataloger's workstation will have a graphic interface; support the display of text, graphics, and video all at the same time; provide advanced retrieval and navigation capabilities; and interface seamlessly with the local online catalog, OCLC, and Internet resources."[16] The author of this particular specification also lists about a dozen machine-readable resources to which the workstation should have access, many of which do not yet exist in machine-readable form. Matthews, who does not specifically use the term "cataloger's workstation," nonetheless lists over a dozen possible computer-mediated solutions to cataloging problems, from context-based help to spell-checking.[17] Still others place great reliance on the cataloger's workstation as a training tool for new catalogers.[18]

The range of definitions can be at least partially explained by differences in the environment in which work is to take place. When manufacturers of self-contained, integrated library automation systems (for example, SuperCAT[19]) speak of a cataloger's workstation, they are referring to an environment that is designed for the microcomputer from the bottom up. The only limitations are on the creativity of the designer, the innate processing power of the microcomputer, and the availability of various resources in machine-readable form.

On the other hand, a cataloger's workstation for use with a bibliographic utility or with a mainframe-based system such as NOTIS must work within the limitations of that environment. If the bibliographic utility or library automation company is also designing the cataloger's workstation, a good opportunity exists for tight integration. The challenge facing Mann Library was to use the microcomputer's flexibility to soften the rigidity of the mainframe NOTIS environment without having the ability to modify the mainframe software at the center of the operation.

THE ROLE OF MICROCOMPUTERS

Since microcomputers have been around for over fifteen years, and commonplace in libraries for at least ten, it is reasonable to ask why they have been so little used for this purpose in the past. In other words, why have microcomputers been used in technical services primarily as terminal emulators? One explanation centers on the evolution of computing environments since the introduction of the first bibliographic utility. With a little oversimplification, computing paradigms can be conveniently segmented into decades. The 1960s were the era of batch computing, the 1970s were the time-sharing era, the 1980s were the glory days of the standalone PC, and the 1990s appear to be headed toward domination by client-server computing and networks.

Batch computing was inconvenient, but it was all that early mainframe systems could provide. Time-sharing brought the power (and inflexibility) of the mainframe and minicomputer to users' desks. The PC promised deliverance from the inflexibility of mainframe applications and character-only terminal interfaces, offering control, continuous access, graphics, and customizable applications. Unfortunately, it also lacked the mainframe's vast stores of RAM and magnetic disk, as well as its blazing speed. In particular, PCs prior to the mid-eighties were insufficiently powerful to support task-switching in any useful fashion, let alone true multitasking or multiuser operation. It was not until the late eighties that PCs with sufficient power became truly affordable.

Microcomputer networks based on recent-generation PCs and Unix workstations based on client-server architecture are providing a means to combine the best characteristics of 1970s and 1980s computing. Users can once again share high-speed printers and large amounts of RAM and magnetic storage without having to sacrifice the best aspects of PC software that matured during the 1980s.

Unfortunately for technical services staff at large institutions, the promise of micro-based networks and client-server architecture has not yet been realized. Unlike the situation at small institutions, where a collection of

stand-alone or networked microcomputers might actually replace functions previously performed by mainframe computers,[20] integrated library automation systems that provide acquisitions, cataloging, circulation, reserve, serials control, and OPAC services for a large institution must serve hundreds of simultaneous users—a task still largely in the realm of mainframe computers running time-sharing operating systems. Such systems do not typically support many of the conveniences that have become standard in modern microcomputer applications.

Born of a very specific need, the Mann Library TSW is necessarily somewhat idiosyncratic and geared toward the environment in which it was created. Other customized library workstations have shared these characteristics.[21] We do not expect our work to be universally applicable. However, it should at least provide food for thought for many staff in technical services who feel left out of the microcomputer revolution.

GREAT EXPECTATIONS

The software initially loaded on the Mann Library technical services ASTs consisted of MS-DOS 3.3, WordPerfect 4.2, and Kermit 2.31, a public-domain serial communications package. In that first incarnation, technical services staff had before them a machine that could be used for some fairly sophisticated word processing but did not even measure up to the IBM 3163 for NOTIS work, since Kermit does not support the ALA character set. This falls short of even the most rudimentary concept of a TSW.

Even in this limited environment, however, technical services staff began to assemble a wish list of features and functions that went well beyond any capability they had seen on an OCLC or RLIN terminal. Staff requested everything from user-programmable keyboard macros to cut-and-paste features, from built-in mathematics functions to local databases.

Staff preferences may have been influenced by the development of powerful applications software that was already much in evidence by the late eighties. WordPerfect users were aware that a primarily text-oriented program could have the ability to perform simple arithmetic. Lotus 1-2-3 users knew the power of macros to simplify repetitive tasks. Macintosh users were accustomed to relatively effortless movement of data within documents and between applications. In most cases, staff requested features that they had never seen in a technical services-specific application yet had faith could be provided by a microcomputer.

Without prior exposure to microcomputers, it is unlikely that staff would have compiled such a long and sophisticated list of desired features. Microcomputers at Mann supported a variety of computing activities even while typewriters remained the predominant cataloging technology, so staff had the opportunity to become acquainted with their capabilities. The library's early adoption of microcomputers and its ongoing commitment to user training ensured a high level of awareness and sophistication among the staff. Thus the real challenge became how to convert the wish list into reality.

GOALS OF THE TSW PROJECT

The staff began discussing the concept of a TSW at departmental meetings. Most of the staff requests focused on what could be termed the mechanical aspects of technical services work. While a few of the desired enhancements could not be easily provided without major changes, a surprisingly high percentage appeared to be deliverable with the right combination of properly configured microcomputer software.

The staff agreed that a TSW should include the following special features:

- Support for diacritics
- Multiple communications sessions, allowing simultaneous connections to a number of bibliographic resources
- Access to online information sources
- Record transfer
- Sophisticated editing capabilities
- Easily programmable function keys

Once the technical services staff had identified these enhancements, the development phase began. One of the authors was hired as a library intern to examine the computing environment of the department and to make recommendations on how the above goals could be met. A project team, consisting of staff from Technical Services and the Information Technology Section, was also formed. The results of the intern's work were used by the team to construct a prototype TSW. In addition, five technical services staff members were selected to work with the project team.

These five pilot participants, representing both the cataloging and acquisitions divisions, were involved in both the evaluation of the software and the configuration of the TSW.

COMMUNICATIONS NETWORK

The first requirement for implementing the desired enhancements in a TSW was support for the ALA character set. The standard communications package used throughout the library was Kermit, which did not support the extended character set. This forced staff to do all their foreign-language processing on a dedicated IBM 3163 terminal rather than at their own workstations. To rectify this situation, copies of YTERM, a communications package developed at Yale University, were obtained. YTERM enabled the microcomputers to emulate 3163 terminals, which gave staff the full use of the extended ALA character set.

Over the past few years, the Cornell campus has been moving away from an asynchronous communications environment and toward a new TCP/IP network, which is faster, more reliable, and easier to maintain. However, YTERM could not be used with the new network, and a new communications package that provided the same level of diacritic support was needed.

The project team worked with Cornell Information Technologies, the central computing department at Cornell, to modify the locally developed PC Telnet package. This collaboration produced an enhanced version of the program that included the incorporation of the ALA character set, giving staff the same degree of functionality as was available with YTERM. The RLIN keyboard layout was used, since the technical services staff was already familiar with entering diacritics on an RLIN terminal. An online help facility, which provided a list of diacritics as well as the key combinations used to enter them, was also installed.

Another enhancement that the Cornell Telnet package provided was the availability of color highlighting for those staff members who had color monitors. This is particularly useful when accessing NOTIS, which uses different colors to indicate protected fields, errors, and other important information. The staff were able to customize Cornell Telnet to use whatever colors they preferred.

Other modifications currently being explored include the capability for multiple Telnet sessions, an easy record-transfer facility, and a printer driver that recognizes the extended ALA character set. These enhancements would enable staff to be connected to both the local system and a national utility, to download records at their own workstations, and when necessary, to print an accurate bibliographic record.

OPERATING ENVIRONMENT

During development work on the TSW, it became clear that the standard DOS environment the staff was using would be inadequate for the project. Staff needed to run a number of programs simultaneously, transfer information between programs by cutting and pasting, and write macros easily. None of these capabilities was provided by the DOS environment. Three packages that did provide some of the needed functionality were investigated: DESQview, Microsoft Windows, and OS/2.

DESQview version 2.26, a multiwindowing environment from Quarterdeck, provided many of the enhancements that the staff had listed, and it ran well on the 80286-based machines in technical services. Under DESQview, each program runs in its own separate "window," and switching between programs is accomplished with a few keystrokes. In addition, DESQview can create more room in memory by moving, or "swapping," an active program out to the hard disk, enabling several programs to share the same amount of memory. DESQview also offered an easy-to-use macro capability and a cut-and-paste utility.

The second environment evaluated was Microsoft Windows, versions 2.1 and 3.0. Windows' easy-to-use interface made it an early contender, but it was felt that Windows, with its graphics orientation, did not fit as well with the text-intensive environment of technical services. The program also did not run correctly on the standard 286 machines; installing Windows would have required a memory upgrade and a mouse for each workstation.

Finally, we evaluated IBM's OS/2 version 1.2, which seemed to be a logical choice because it was an operating system designed for multitasking. Again, however, we ran into difficulty when using the program on a 286-based workstation. Installing the system on

staff workstations would have required a significant amount of additional memory. In addition, there were few OS/2-compatible programs that were available at the time. The project team thus eliminated both Windows and OS/2 from consideration and chose to use DESQview.

PERSONAL INFORMATION MANAGERS

During technical processing, both the acquisitions and cataloging staff frequently make reference to lists of standardized codes, abbreviations, and procedures. One of the goals of the TSW was to provide easy access to these resources in electronic form, allowing staff to search and retrieve the information without having to exit the system.

In the early phases of the project, the potential for using compact discs as a source of information was investigated. As a test, Microsoft Bookshelf was installed under DESQview as a stand-alone application, and it worked well in this environment. Although the test showed that it was feasible to use CD-ROMs with the TSW, there was no cataloging or acquisitions "Bookshelf" available that could provide access to a broad range of information resources. It became clear that such electronic resources would have to be developed locally. The project team thus began to research personal information management software for the PC and evaluated two packages: Micro Logic's Info Select and Broderbund's MemoryMate.

Info Select offered many of the search and retrieval capabilities desired by the staff. Information could be organized into "stacks" of windows, which could be accessed through menus and hypertext links. Info Select also provided advanced searching and sorting capabilities, and it appeared to work well with DESQview.

In evaluating Info Select as part of the technical services workstation, however, a few problems emerged. The biggest difficulty was in Info Select's use of memory; the program required at least 256K to function properly, plus enough additional memory to load the entire database that was being searched. When Info Select was run under DESQview and the staff attempted to access a particularly large list, the program would run out of memory and interfere with other programs. The only solution was to break up the information into smaller pieces and access it through several layers of hypertext menus. Since the staff found the menus to be somewhat complicated and confusing, this was not a viable option.

MemoryMate version 3.04R, the other program tested, avoided many of the memory problems inherent in Info Select by storing the data as a series of individual fixed-length records and loading only a few at a time. Other pieces are brought in if needed. The searching capabilities matched those under Info Select, and the staff found MemoryMate easier to use and to understand.

With MemoryMate, the technical services staff developed several electronic lists. These are summarized in figure 1. All of these resources are designed to facilitate the staff's processing work.

IMPLEMENTATION AND TRAINING

The TSW, consisting of the DESQview, Cornell Telnet, and MemoryMate software packages, offers a great deal of flexibility to the staff for a modest cost of less than $200. Within DESQview, a set of macros was installed to automate the logon procedures for the commonly used bibliographic utilities available through the campus network or the Internet. These included the local NOTIS online catalog, RLIN, OCLC, and Faxon's DataLinx. Other macros were created to perform repetitive tasks, such as deriving bibliographic records from the locally mounted resource file.

Figure 2 shows a typical session on the TSW, with NOTIS running in one window, MemoryMate in a second, and the DESQview menu in view. A standard workstation configuration was installed on each machine, but it is possible for each staff member to customize the workstation to meet his or her needs. This can be done by using DESQview macros and customized MemoryMate databases.

While the DESQview program was intended primarily for accessing Cornell Telnet and MemoryMate, the technical services staff regularly use other software packages, such as WordPerfect and Quattro. The installation procedure allowed all the programs on a staff member's hard disk to be accessed through DESQview, not just those programs directly related to the TSW. In this manner, DESQview became the standard environment for the machines in technical services.

Once a configuration for the TSW had

been determined, the issue of training staff in the use of the programs arose. The five pilot participants, who had been involved in the design of the TSW from the beginning, were trained in its use first. Because of their earlier training, the pilot group was able to pinpoint problem areas, assist in training the rest of the staff, and serve as a departmental resource. Classes covering the various parts of the TSW—DESQview, MemoryMate, and the TCP/IP environment—were given to all staff members, and informal workshops on specific software features were also held during departmental meetings. When the training of the technical services staff was completed, the TSW was installed on everyone's machine.

THE NEXT STEP

Although technical services staff gained more flexibility and processing became more efficient with the TSW, there were several features on the initial list of enhancements that were still not incorporated. In addition, new developments in computer and networking technology made possible other needed improvements. In this section, the goals established for the next phase of the project will be described and some possible applications for

Figure 1. Menu of Electronic Resources Loaded under MemoryMate.

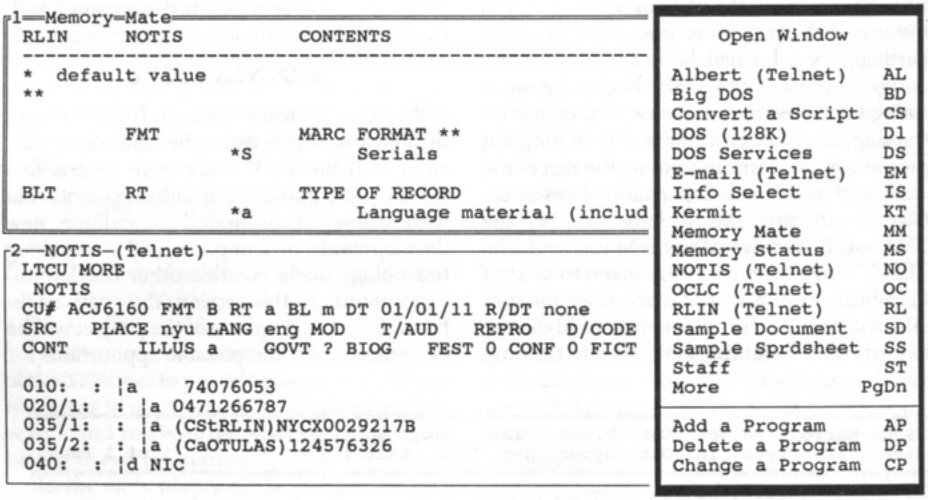


Figure 2. A Technical Services Workstation Session. The DESQview menu lists several programs that are accessible from the TSW environment. The NOTIS and MemoryMate windows are shown at a reduced size, although both windows could be "zoomed" to occupy the entire screen.

the latest computer and information-retrieval technologies will be outlined.

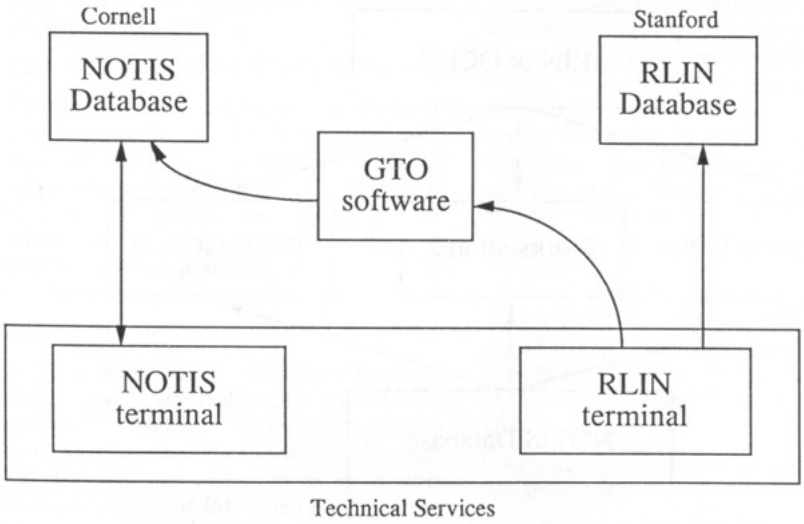
Record Transfer and Multiple Sessions

Moving records easily from the national utilities to the local database is a basic function for both acquisitions and cataloging staff. The current process, which relies on a NOTIS, Inc., software component called GTO (generic transfer and overlay), is a cumbersome and awkward procedure. Figure 3 illustrates the steps in the process of transferring a record from the national database to the local database. Technical services staff rely on RLIN and OCLC copy at various points in the processing routine—from placing orders, to upgrading copy at the point of receipt, to locating fuller copy for cataloging. A streamlined record transfer procedure, handled at a single workstation, would improve efficiency for both cataloging and acquisitions staff. A possible alternative to the current GTO configuration is illustrated in figure 4.

DESQview's mark and transfer function supports some data transfer. For example, staff can move a bibliographic record from the Library of Congress resource file (i.e., a NOTIS database containing Library of Congress records for the last three years) to the production file or mark an authority heading and insert it into a bibliographic record. However, transferring the entire record from one system to another (e.g., RLIN to NOTIS) is complicated by reformatting problems. We are exploring ways to enhance DESQview's mark and transfer function by designing a local DOS application to capture the marked record and reformat it.

Multiple sessioning is an important function of network software that allows a workstation to connect to several host computers simultaneously using only one physical cable line. It will greatly improve the convenience and efficiency of the record transfer procedure. With this function, staff can open and view more than one database, e.g., RLIN, OCLC, and NOTIS, on a single workstation and easily transfer the records between them. There are several PC telnet packages that support multiple sessions (for example, Clarkson Telnet developed by Clarkson University), but none of them supports ALA diacritics. To remedy the lack of a multiple-session function in the PC-side network software, programming staff are investigating the software product called PKTMUX Packet Driver Multiplexor developed by G. W. Robinson at Rutherford Appleton Lab in the United Kingdom.

Other developments relating to record transfer and multiple sessions are worth mentioning. On the Macintosh side, a Cornell-



(1) Search NOTIS to verify no cataloged record exists.

...Go to RLIN terminal...

(2) Search RLIN for a better record.

...Go to NOTIS terminal...

(3) Search for the record that will be overlayed and key in RLIN ID into the 035 field.

...Go back to RLIN terminal...

(4) Search the record and pass it in RLIN.

...Go back to NOTIS terminal...

Figure 3. Steps in the Process of Transferring a Record from RLIN to the Local NOTIS Database.

designed telnet package called Comet provides multiple sessions, diacritic support, and record transfer from RLIN to Cornell NOTIS. At Vanderbilt University, Marshall Breeding has taken a different approach to accessing multiple network resources.[22] Breeding describes a technical service workstation providing access to NOTIS/OCLC/GTO simultaneously via three cable lines to the individual workstation.

Expert System Applications

Expert system technology was introduced over twenty years ago. In the last ten years, researchers in library studies, information science, and computer science have experimented with applying expert system technologies to the processing routines of libraries. Both Anderson and Schuegraf summarize some of these projects in their review articles.[23,24] Because cataloging is considered the most sophisticated practice in library technical services, most of the research has concentrated on this process, and in the last five years, there have been several significant achievements in the field:

- MITINET/marc system (1986) translates bibliographic data into the appropriate

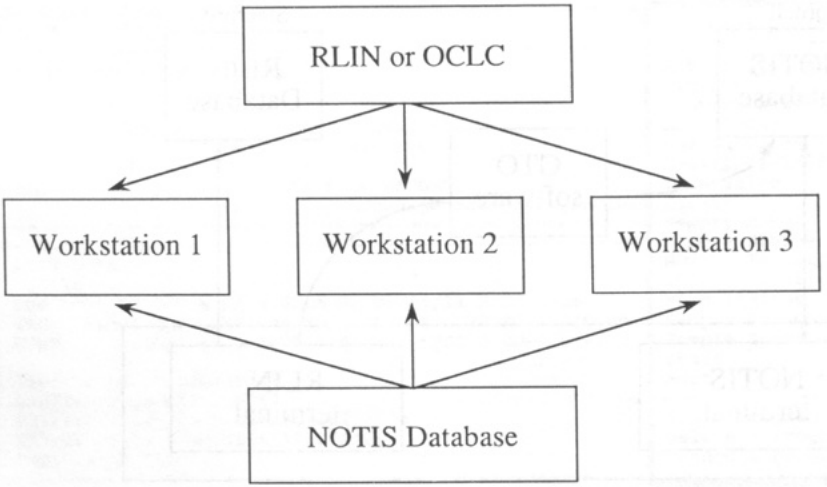


Figure 4. Possible Alternative to the Current GTO Configuration.

MARC format during a human-machine interactive process.[25]

- ESSCAPE assigns access points for entries according to chapter 21 of *AACR2*.[26]
- MAPPER assists map catalogers in descriptive cataloging by providing selected appropriate *AACR2* rules.[27]
- Catalyst aids catalogers in creating their records by providing the explanation of relevant *AACR2* rules.[28]
- TSBN assigns subject headings and classification by testing the term frequency in the content of the book.[29]
- Harris and his colleagues are developing a prototype expert system for subject cataloging by combining an empirical approach based on title content with the National Library of Medicine's Unified Medical Language System (UMLS) Meta-1 metathesaurus.[30]

Most of the existing expert systems are experimental in nature. The projects do show, however, that expert system technology can be applied to the cataloging process in order to provide assistance for: (1) comprehensive interpretation and integration of various rules, formats, etc., (2) online training and tutorials, (3) navigation for information searching, and (4) system self-learning from human experience and practice.

Perhaps the most complicated piece in the cataloging process is subject cataloging and classification. Here catalogers examine the content of the material, analyze it, find appropriate *LCSH* headings, and assign the correct classification number. The process can be very time-consuming and is dependent on the cataloger's subject background and experience. Such an experience-related process suggests that an expert system might be applicable. If successful, such a system could increase the efficiency of subject cataloging and classification as well as assist the cataloger in assigning the most appropriate terms.

In the next phase, the project team will explore expert system technology in subject cataloging work. Briefly, this system will utilize the pattern: "give me some words about the title and content; I will give you what we have done with these in the past." A conceptual model that simulates the work habits and thinking catalogers use to accomplish their subject analysis will be developed. This model will be applied to a specific discipline for testing; meanwhile, a knowledge tree and term index will be constructed, and an inference engine and user interface developed. Catalogers will be able to trace the logic the system used to suggest the subject terms and classification, and users will be able to inte-

grate their current experience into the knowledge base.

THE IMPACT OF NEW TECHNOLOGY

Computing and networking capabilities are evolving quickly, and the TSW developed in 1990 will soon be as antiquated in technical services as the manual typewriter. Two of the more exciting possibilities include developments in network technology, such as Z39.50, and the potential of the UNIX operating system.

Z39.50 Protocol

In 1988, the National Information Standards Organization (NISO) issued the Z39.50 Information Retrieval Service Definition and Protocol Specifications for Library Applications. The standard was written as an application-level protocol of the ISO Open Systems Interconnection model (OSI).[31] In recent years, there has been great interest in building Z39.50 applications on top of the well-established Department of Defense TCP/IP protocols running on the Internet. Such a network mechanism provides the possibility that information retrieval on the Internet could be done among different computer systems regardless of their types, models, and vendors.[32]

The Z39.50 protocol has several features useful to library information retrieval and technical services processing activities. Among these are search syntax translation, resource and access control, and electronic record transfer.

Searching databases is one of the main functions in library processing. As the number of available databases increases, however, staff must contend with the complexity of different searching environments. The Z39.50 protocol "specifies both a general framework for transmitting and managing queries and results and a syntax for formulating queries. The search and record transfer framework is quite independent of the semantics of the information being retrieved."[33] For example, a staff member can use the search syntax of the local system for searching a remote database. The Z39.50 protocol would translate the local syntax into the search syntax of the remote system. With a Z39.50 application, search queries can be sent to several remote information resources simultaneously.

The standard also provides a mechanism whereby unsolicited status reports are sent to the searcher during the processing of an operation. With this resource control feature, staff could decide whether to proceed with a search that might be lengthy or expensive. Finally, Lynch suggests that some of the complexities and idiosyncrasies of electronic MARC record transfer could be ameliorated by various applications of the Z39.50 standard.[34]

Based on Z39.50 protocol, NOTIS, Inc., is testing PACLink, which will allow users to search several remote databases at some NOTIS selected sites.[35,36] They are investigating a similar product, Techlink, for technical services operations.

UNIX as a Technical Services Environment

Most DOS-based multitasking operating environments like DESQview are fashioned by applying time slices and task-switching techniques to a single-tasking environment. These programs create an illusion of a multitasking environment. There are limitations, however, if the applications are large or too many windows are opened. Since UNIX systems are generally based on CPUs with large address spaces, they are naturally better suited to multitasking and multiuser applications than DOS-based operating environments.

- UNIX is a true multitasking environment that allows a user to run more than one application at a time. Several processes can be run in the background while the user works with the application displayed on the screen.
- UNIX is designed as a multiaccess system, which allows users to access and share the same system resources simultaneously. This feature also provides system consistency, lowered costs of using system resources, and more convenient application development.

Online cataloging in many academic libraries is undergoing a transition from reliance on a national database (e.g., RLIN, OCLC) to processing on a local database. With recent developments in networking and computer technologies, it is possible to imagine a UNIX server, LAN, and individual workstation constituting a local processing system. Figure 5 shows such a configuration. This UNIX-based environment could provide staff members with the advantages of local-level

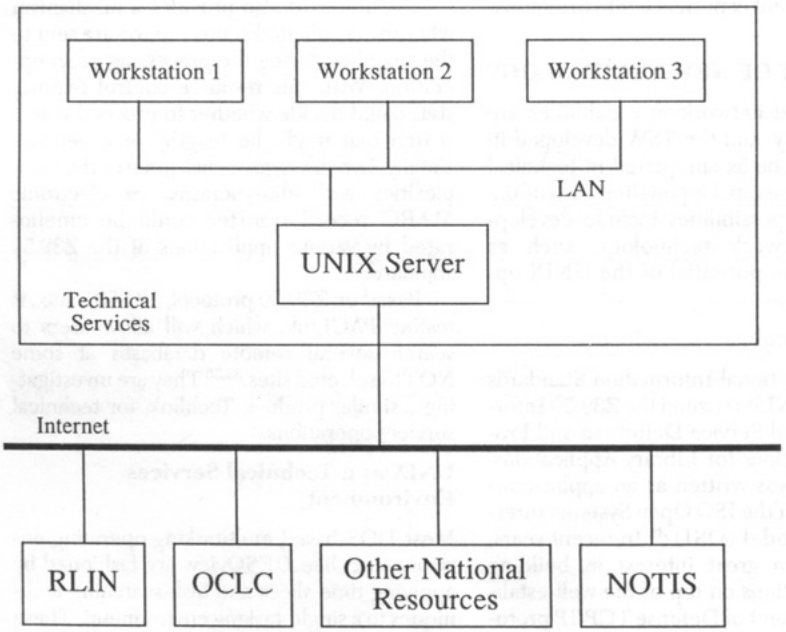


Figure 5. UNIX Server, LAN, and Individual Workstation Constituting a Local Processing System.

processing without losing any networking capabilities. These advantages might include:

- Multitasking, providing staff with the capability to work on the local cataloging application and to access and search the campus and national databases simultaneously;
- Upload and download capabilities, allowing staff to process records at the local workstation level. This would be less subject to interference from network or campus database failure;
- Access to various technical services tools from both the UNIX server and personal information manager applications on the microcomputer workstation; and
- Greater convenience for local application development and validation.

CONCLUSION

It is clear that the next phase of the TSW should include an investigation of UNIX and the evolution of the Z39.50 standard. Other technologies worth exploring include hypermedia for information association and retrieval, the X Window System for the display of graphical information, CD-ROM technology to complement the personal information manager, and the Unicode standard, a new 16-bit standard that encodes the characters needed to display the major languages of the world.[37]

The TSW project began with a wish list. Most of the items on this initial list have been implemented, and programming staff continue to work on the remaining enhancements. What is clear, however, is that the technology upon which the Mann Library workstation is based is now archaic. The limitations of a 286 environment are being reached and it will soon be necessary to upgrade this standard configuration. For staff accustomed to tinkering with old manual typewriters and antiquated terminals, it is hard to adjust to the swiftness with which technology becomes obsolete. Technical Services should recognize, however, that it has only begun to exploit the power of microcomputers, networking, and the electronic infrastructure. As the information literacy skills of staff increase, the list of required enhancements grows. Although computing technology is evolving at a dizzying rate, it is important that technical services staff cultivate an

interest and an awareness of these developments. They must be able to articulate their needs and acquire new skills in order to collaborate with technology support staff. With these partnerships, technical services staff will be able to help guide the application of these emerging technologies to the processing tasks of the future.

ACKNOWLEDGMENTS

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Computer-Oriented Bibliographic Control for Cyrillic Documents with or without Script Conversion

Alena L. Aissing

Most libraries in English-speaking countries own materials in nonroman scripts. Access to these documents is provided through romanization. Online catalogs often hold a large number of romanized bibliographic records. Research into users' needs for searching and displaying the original nonroman alphabets has been under way for some time. In most libraries, users are not able to search and display a bibliographic record in the script of the original document. A simple process that eliminates the need for storing both original and transliterated forms in bibliographic records is introduced. The conversions are done locally using a microcomputer. The user can search both the romanized and the original alphabets. The system is based on the fact that transliteration must necessarily be a reversible process for alphabets with a limited number of graphemes. This system would fail for some of the simplified transliteration schemes and in these cases would only work with human intervention or with the use of a spelling dictionary. The Slavic languages with the Cyrillic alphabets are used as examples throughout.

BIBLIOGRAPHIC ACCESS TO NONROMAN DOCUMENTS

In Anglo-American libraries, most of the cataloging of documents written in nonroman scripts has been done in romanized (transliterated or transcribed) form. As a result, there now exists in card and online catalogs a large body of items cataloged in this way. A well-known but often ignored problem is native speakers' access to those vernacular documents through the transliterated bibliographic records.

Early in this century, before library automation existed, linguists and librarians investigated the applicability and usefulness of transliteration. Sommer questions the usefulness of transliteration:

> For whose benefits is the transliteration made? Is it primarily for the readers or for the staff? On consideration, there can be but one answer: it is for the staff, or, more generally, for those who are unable to read the original script . . . As to the foreign readers, they naturally prefer the original script and derive practically no benefit from the transliteration.[1]

One of the many concerns of Wellisch is the incompatibility of transliteration schemes both nationally and worldwide. Furthermore, transliteration may result in the loss of information content of the original, nonroman scripts. For those able to read the original script, transliteration then serves as a barrier.[2]

An example of this is found in ongoing research done with users.[3] A sample of fifty undergraduate Russian-language students

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was randomly chosen from the Germanic and Slavic Languages Department at the University of Florida during the spring semester of 1991. None of them was familiar with the Library of Congress transliteration table. The students were asked to transliterate Russian data from Cyrillic into the roman alphabet in order to be able to search for the given item on a computer. In fact, they were asked to write down how they would enter the item into the computer in the roman alphabet. The data were collected using two tests that consisted of a list of titles and proper names in Russian. Two different conditions were observed in the same sample of students.

Test A: How correct are the students' searches without the knowledge of the transliteration table, and what are the problems involved?

Test B: How correctly do students search after instruction and practice in the library? Do they still have problems? How much did they improve?

One finding that emerged from statistical analysis of the data was that without knowledge of the Library of Congress practice to transliterate, for example, the Russian я by ia, 80 percent of the students chose ya, whereas only 7 percent were correct. (For simplicity the diacritical marks were omitted from the test. The students were not asked to include these.) When the students were asked to transliterate the Cyrillic character phonetically similar to the English "sh" (as in the Russian word *shuba*, fur coat), 91 percent were successful even without knowing how to transliterate. Apparently any grapheme that is transliterated by a letter combination for which the English pronunciation does not resemble the Russian sound acts as a barrier to access. Instruction and approximately one month of practice resulted in a significant improvement in the test scores.

This result was anticipated by Durance, who remarked:

> Although transliteration must sometimes be used in performing library and information functions, its shortcomings are so severe that such techniques cannot be considered an optimal solution to the processing of bibliographic and information data bases . . . .[4]

Unfortunately, librarians generally are not very interested in the development of computers and equipment for nonstandard characters.[5] The response to propositions regarding this subject is frequently negative and unenthusiastic.[6]

MULTISCRIPT DEVELOPMENTS

The *Anglo-American Cataloguing Rules*, 2nd edition (*AACR2*), Rule 1.0E,7 requires that descriptive cataloging be in the language and script of the item. The IFLA guidelines take this point even further by including access points also:

> Cataloging of all library materials should, where practically possible, be in the original language and script; subject access in the national language(s) may be provided additionally for the use of library staff, together with transliteration where necessary.[8]

New technologies and methods that are byproducts of the enormous growth of computer speed and versatility will soon be introduced into library systems. Moreover, with the world drawing together and relying increasingly on efficient interchange of information, it becomes apparent that uniform formats and standards are needed. According to Tucker, "There is one absolutely overriding reason for having standards for the way different scripts are encoded for data processing: communication."[9] Clews defines technical standards and also ASCII, REACC, ISCII, EACC, and other character sets on an international and national basis with the emphasis on nonroman scripts. Multiple-byte character codes within ISO (International Organization for Standardization) could enable access to most of the generally used characters in all the world languages and to the ideographic characters that are used rarely.[10] Before introducing these implementations and changes, however, many choices need to be made with respect to standards that are crucial for the interchange of bibliographic data as well as for the needs of users. A database implementation for vernacular scripts should be simple, quick, and aesthetically pleasing. MacDougall specifies several elements that should be considered when planning to add vernacular scripts into the library's online system: users' needs, selection of the character set(s) and coding standards, accommodation of the MARC record, available resources, cost, indexing, menus and messages, input and output, bibliographic exchange, etc.[11]

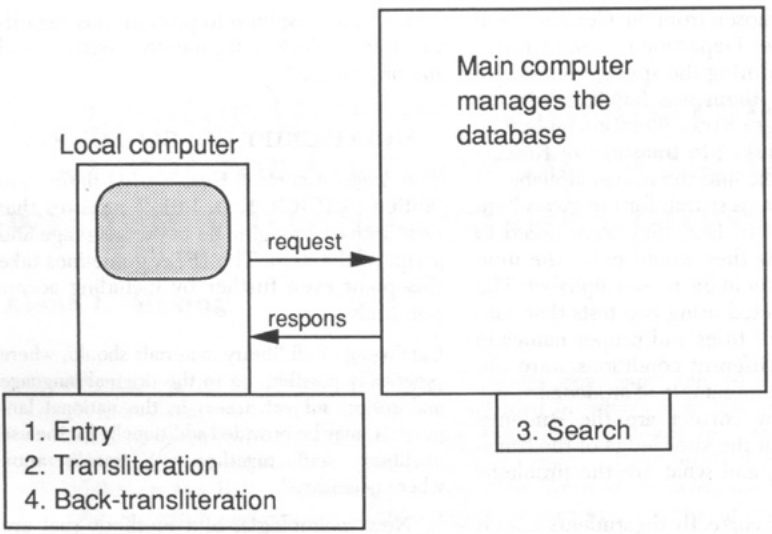

Figure 1. Graphic Representation of the Search Process.

SOFTWARE-BASED CONVERSION FROM ROMANIZED RECORDS TO CYRILLIC DISPLAY

As mentioned previously, most cataloging of nonroman script currently done in Anglo-American libraries is by transliteration alone. Existing records will have to be converted to conform to new or altered standards. This will involve not only large amounts of time but also the recreation of a large body of work. The same holds for the databases in other countries, where alternative methods have been used. The accessibility of these databases is seriously impaired by the differences in cataloging rules and the handling of foreign scripts.[12]

Can such a task be automated? This is indeed possible, although probably not completely so. For languages with compact alphabets such as Cyrillic, the transliteration process—assuming no mistakes are made—is reversible. That means that the transliterated record *has the same information content* as the record in the original script. In other words, no information is lost (or added) during the transliteration process. This is, in fact, one of the reasons transliteration is preferred over transcription. In Cyrillic, differences between the original script and the romanized version are accommodated by certain diacritical marks and letter combinations, creating a representation that should be in a one-to-one correspondence with the original. If this process is executed without errors, there will be little ambiguity in the reverse process. Whenever the relation between two sets of information has this property of uniqueness, the "translation" between them can be automated easily.

An interesting aspect of a software approach is that it can be used as a local interface. A microcomputer or workstation could run a special program that transliterates the search information before submitting it to the main computer that manages the database. For users, the system would be completely transparent, in that they would remain unaware of the intermediate steps and would be led to believe that the search is done in the original language using the original alphabet. Figure 1 illustrates this process. The information the local computer receives is transliterated back and appears on the screen in the original representation. Note that there is no need to store the information in the original alphabet.

To illustrate the feasibility of this approach, a small program has been written that will transliterate from the Cyrillic into the roman alphabet according to the rules of the Library of Congress.[13] Figures 2 and 3 show Macintosh screen displays before and after the transliteration process of a simple piece of

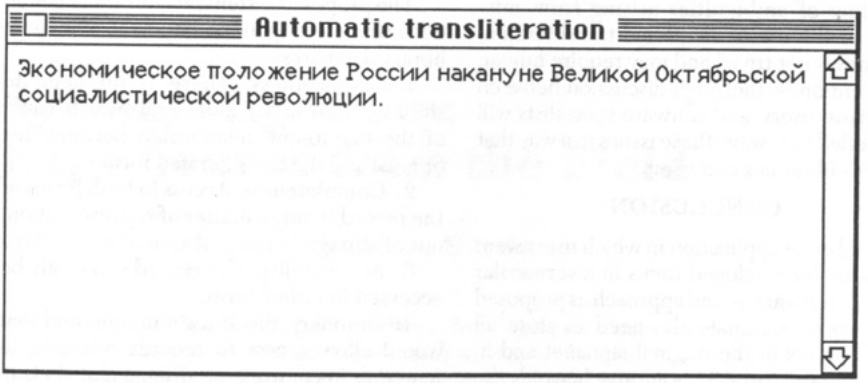

Figure 2. Screen Shot of Macintosh before Transliteration.

text. The program can successfully work both ways. The principle of this program is exceedingly simple and easily implemented. With the help of menus, the user determines the language of the Cyrillic record, thus choosing the appropriate transliteration table for that language.

However, the success of the back-transliteration depends on the accuracy of the original transliteration. As with all automated translation processes, errors in the input will result in erroneous output. Therefore, human intervention may be needed in those cases where, as a result of some kind of error or the use of incomplete transliteration tables, the algorithm of the program is not able to function. In case of back-transliteration to the Cyrillic alphabet, the omission of diacritics will result in ambiguities that may need human intervention or the availability of spelling dictionaries to complete the task of back-transliteration. These options are open to any actual implementation. They will probably slow down the process, but, especially with large databases, the delay will be negligible compared to the time spent accessing the database during searches.

A number of questions remain to be considered. For example, which fields in the records will be accessible in the vernacular script? How will the records be sorted—according to the romanized entries or according to the nonroman alphabetical ordering? The actual implementation must include knowledge of the rules concerning the placement of special fields indicating the character set used and the language involved. In principle, it is also possible to use this software-based approach to overcome the differences between the possible formats. Furthermore, the

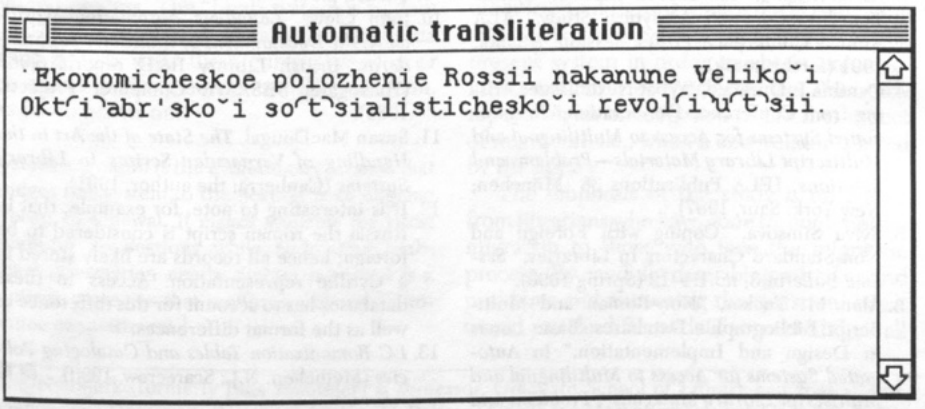

Figure 3. Screen Shot of Macintosh after Transliteration.

handling of ambiguities arising from mistakes or the use of simplified transliteration schemes is not trivial and may require human intervention. A thorough discussion between librarians, users, and software specialists will be needed to resolve these issues in a way that satisfies librarians *and* users.

CONCLUSION

In a real-time application in which users want to search for cataloged items in a vernacular script, a software-based approach as proposed here would eliminate the need to store all access points in the original alphabet and in transliterated form. This approach avoids the duplication of information as proposed in the original guidelines. Instead, it makes access points available in the nonroman script through the software that is used to search the databases. The time spent in transliterating the records back and forth would be negligible compared to that spent searching the database. Users would not even notice that their entries are transliterated into the form needed to interrogate the database. Russian users would think they are searching in Cyrillic, while English users will believe they are searching in the roman alphabet.

The proposed system satisfies three conditions that are of general importance in large library databases:

1. Compactness. There is no need to store any information more than once, because of the one-to-one relationship between the original and the transliterated form.
2. Completeness. Access in both forms of the record is only a matter of representation, not of storage.
3. Accessibility. The record can easily be accessed in either form.

In summary, this is a simple method that would allow access to records referring to materials in compact, nonroman alphabets in the original script as well as in transliterated form, without the need for storing both forms of the access points explicitly. Thus large amounts of data space could be saved, and the need to update records that are only stored in transliterated form eliminated.

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12. It is interesting to note, for example, that in Russia the roman script is considered to be foreign; hence all records are likely stored in a Cyrillic representation. Access to these databases has to account for this difference as well as the format differences.
13. *LC Romanization Tables and Cataloging Policies* (Metuchen, N.J.: Scarecrow, 1990). ■■

System Migration: Experiences from the Field

Julie Hallmark and C. Rebecca Garcia

Automation administrators of thirty-three libraries discussed challenges, rewards, and problems associated with migration to new automated systems. Interviews focused on motivation for migration, planning for implementation, technical decisions and considerations, training of staff and users, publicity used to promote the change, and relationships with vendors. Descriptions of successful experiences as well as candid analyses of mistakes, false assumptions, and delays provide information and advice for those about to embark on the migration process.

Migration to a new automated system is a fact of life in the world of library automation. Sooner or later many libraries will conclude that, for a variety of reasons, their present system is inadequate. They may require additional functionality, or the current vendor may no longer be viable in terms of products or service. In some cases the library may simply have outgrown the present system; in others, ongoing costs may have become prohibitive. New and emerging technologies often provide the impetus for migration, making possible faster access, lower cost, and enhanced services.

Maintaining the appropriate automated system for a library is an ongoing and never-ending process. The "final" system is seldom final. As needs change, libraries may upgrade their system with their current vendor or choose an entirely new automation solution. As Jacob points out:

> System migration is the evolutionary process that bridges one system to the next. It is an ongoing process of renewal. It makes available the latest computer applications while addressing traditional information needs. System migration is a continuing process that reaffirms a library's automation committment.[1]

Concern about the system migration process and its associated problems remains intense within the profession, as evidenced by the continuing flurry of conferences, journal articles, and workshops on this topic. One expression of this concern, overheard at a seminar on technostress, aptly sums up the feelings of many librarians and offers a rationale for research in the area: "We need a new term in this business: 'technodepression'—when you've just finished installing a new automated system and you realize that in a few years you'll have to do it all over again!"

In general, *system migration* has been defined as the process followed by a library in (1) replacing one automated system with another from a different vendor or (2) remaining with the current vendor and upgrading the present system in order to obtain enhancements and improved performance. This study reports on an investigation of the first aspect of migration, i.e., when a new vendor is hired by the library.

The emphasis of the study is on advice from librarians who have gone through system migration to those who face the migration process. By candidly describing mistakes and problems and answering the question, What would you do differently if you could do it all

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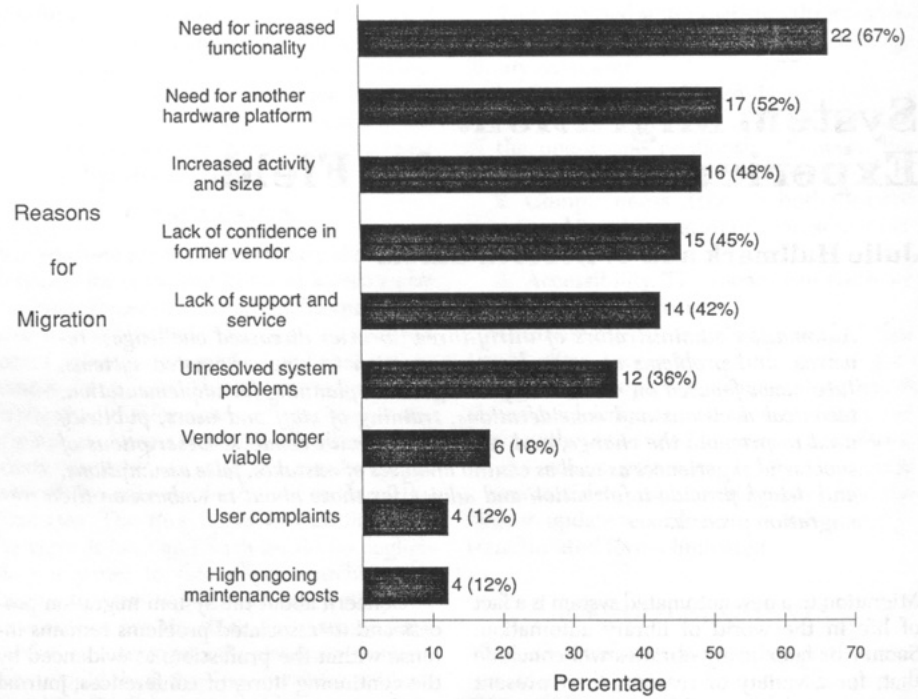

Figure 1. Reasons Libraries Chose to Migrate.

over again? participants paint an honest and realistic picture of their experience.

METHODOLOGY

Seven library automation vendors provided upon request the names of thirty-nine libraries that had recently migrated to their systems. A letter to each of the automation administrators of these libraries described the proposed research and requested their participation in the project. The letter explained that the administrator could expect a call from one of the researchers to set up a convenient time for a telephone interview.

Thirty-three of the thirty-nine libraries participated in the study; a list of these appears in appendix A. Reasons for nonparticipation did not include disinterest or unwillingness to assist in the research, but such factors as the administrator's having moved to another library or the library's being in the very early stages of the migration process.

Lasting about an hour, the interviews revealed details of each library's experiences with migration in the areas described below:

- *General facts about the institution* (supplemented by the *American Library Directory*) such as staff size, number of titles, number of branches, name of the previous system, and year of installation
- *Motivation for migration*
- *Planning for implementation* including development of the implementation plan, staff involvement, timing, and schedules
- *Technical decisions and considerations* such as migration of data, equipment, and telecommunication issues
- *Training* of the staff and users
- *Publicity* used to promote the change to the staff and users
- *Relations with vendors* in such areas as performance and expectations

The following sections of the paper provide an analysis and summary of the findings within these areas.

MOTIVATION FOR MIGRATION

Based on the analysis by Pourciau of why libraries choose to migrate, we developed a list of points for discussion with our targeted sample.[2] Figure 1 illustrates their responses.

Some respondents desirous of increased functionality described poor search engines in their old systems, which, although acceptable for circulation and other staff areas, could not be used for the public access catalog. Others pointed out that their old vendor simply did not offer more than a circulation system and that they had advanced past that stage or were ready for an integrated system as opposed to a collection of stand-alone products.

Respondents who reported outgrowing their system were adamant about the significance of this problem. For example, the need for another hardware platform with additional capacity caused these dilemmas:

> Hardware limitations were our biggest complaint—the system just couldn't handle the load. It took three or four minutes for a search. Horrible!
>
> Everyone had to get off the system so that circulation could check out books. Really maxed out!

Other areas that evoked heated responses from librarians were the lack of service and support and system problems that remained unresolved for long periods of time. As one administrator put it, "We were just looking for a system that didn't go down all the time." The experiences of two other libraries are illustrative:

> The system crashed more than once a day. We wasted ten months without resolution [of the indexing problems]. We received no satisfaction from support and service and never did get subject access.
>
> We were promised 80 ports for terminals but only received 58. We had to schedule when terminals could be used in the branches! We never had more than five of the 19 branches online; the vendor promised more but never supplied them.

More than a lack of functionality, these oversights created bad feelings between the library and the vendor and convinced libraries not to upgrade with the same vendor. In some cases continuing with the current vendor was not an option, as the vendor had gone out of business or abandoned the library's hardware platform.

Some libraries, noting high ongoing maintenance costs as the reason for their change of systems, left a consortium for a less expensive, stand-alone system. Although the consortium was a good idea when it was formed, in some cases the library had grown in sophistication and was ready for the additional flexibility and functionality of a stand-alone system.

Although "lack of confidence in former vendor's future performance" was often a secondary reason for migration, it is interesting to note that of the fifteen libraries in this category, nine also noted poor service and support as a major problem. Not surprisingly, as service deteriorated, confidence decreased. Other problems were failure to deliver on promises, a limited operating system, loss of data on the old system, and a desire for closer coordination with the campus computing center for twenty-four-hour support. One library had funding available and decided it was time to move on.

PLANNING FOR IMPLEMENTATION

Implementation plans or timetables list steps in the proposed implementation, estimate how long each will take, and show who is responsible. Most libraries (79 percent) had implementation plans, although they varied widely in detail and usefulness. A couple were "only in the automation administrator's head"; others incorporated PERT charts, elaborate timetables, and detailed steps with careful estimates of time required for each.

Typically, the libraries without plans were involved in legal or financial difficulties and felt they lacked the time to develop a plan. They simply went along with the vendor's schedule, in one case not really understanding the proposed steps and feeling in large part at the vendor's mercy.

Development of the Plan

In some cases only one person—the director, the associate director, the automation administrator, or the consultant—was responsible for developing the implementation plan. Most libraries, however, depended on some combination of these plus the vendor representative, selected staff members, and occasionally someone from computer services. One of the most common patterns was director or associate director, vendor, and selected staff (automation committee, department heads, etc.). Some libraries were required to

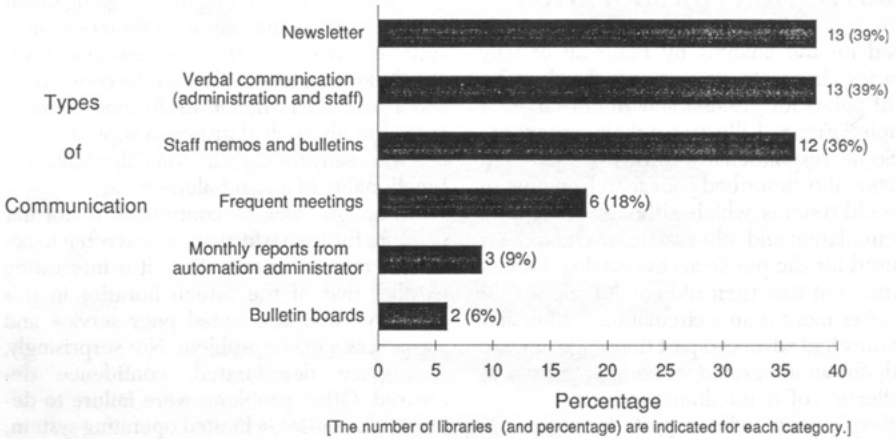

Figure 2. Communication with Staff During Planning and Implementation.

include representatives from city government, the network, or the board of trustees.

In more than half the libraries, staff involvement in the planning process took the form of serving on committees and task forces with such names as Indexing, Circulation, Patron Database, Database Structure, and OPAC (online public access catalog). Staff members typically worked on the module for their department. In 39 percent of the libraries, staff members were not involved in planning or were only marginally involved if the need arose.

Timely and detailed communication with staff during planning and implementation serves to alleviate fears, quell rumors, and avoid splits between favored insiders who know what's going on and everyone else. Most of those interviewed felt that communication was critical to the success of the project and indicated "the more the better." Newsletters, memos, and bulletins with titles like "OPAC Update" or "Notelets on Automation" were the most popular vehicle. Figure 2 shows use of various methods.

Scheduling the Changeover

Several factors influenced the proposed schedule for installing the new system. About half the libraries chose a summer or holiday break or a part of the semester when they were least busy. A new building or building renovation was the deciding factor for nearly one-quarter. The remainder had little choice as they were faced with pressures from old or new vendors, deadlines from their consortium, major budget considerations, or legal entanglements. They elaborated on the factors that influenced the timing of the changeover:

> Desperation. We hired a consultant on March 7, had 19 days of conversion, and by March 26 were on the new system. All conversion, training, etc., took place during that time.
>
> We had to be off the old system by the end of the budget year. The network was going to charge $65,000 up front on July 1!
>
> We wanted the installation to be ASAP, so the PAC could be up preceding a vote that was to impact library funding.

Planning carefully for the timing of the change is one thing; adhering to the schedule is another. More than half the libraries in the study were unable to keep to their schedules due to unforeseen difficulties, such as:

- Site preparation delayed (cable not pulled in time)
- Contract negotiation; delay in signing contract
- Hardware availability
- Ethernet/telecommunications problems
- Delays associated with the new building
- Conversion/database load problems

Eight libraries kept on schedule, one "by the skin of our teeth"; three managed "fairly well"; and in two libraries the migration process went faster than anticipated.

Downtime

Downtime was an insignificant problem for most of the those interviewed. Sixty percent experienced no downtime at all since they used backup systems effectively or ran systems in parallel. Others reported downtime of up to a week (21 percent), ten days to two weeks (12 percent), and one month to six weeks (6 percent).

Contributing to the downtime were problems with loading data, hardware (cabling), inputting transactions, using the same hardware for both systems, delays from third-party vendors, and delays with the new building. Happily, in the views of those interviewed, downtime had no effect on staff or user acceptance of the new system. After all, as one director stated, "We'd had so much downtime with the old system, we were used to it."

Advice for Improvement

Automation administrators offered the following advice on planning:

1. Communicate with staff. "Communication equals involvement and people did not feel very involved; communication is so important and we had no mechanism for it."
2. Test in advance. "We had a poor backup system and major problems in loading transactions. The computer department's program to output old transaction data and load [them] onto the new system didn't work when the time came."
3. Involve staff in the process. "Our reference librarians should have set parameters."
4. Build in sufficient time for data transfer. "We were too confident and trusted the new vendor too much. Every site is unique and will be a whole new experience for the vendor."
5. Be skeptical about the time frame for changeover. "Hold the vendor to dates promised and try to get them to be realistic."

TECHNICAL DECISIONS AND CONSIDERATIONS

The most complex part of system migration proved to be moving the library's database. The database is the only component of any automated system truly unique to the library, and its successful transfer is critical to the success of the project. Sometimes included with the migration of bibliographic data were item data (information concerning library holdings or copies of materials) as well as patron and transaction information. In this section we also address choice of hardware, telecommunications, site preparation, and labeling.

Data Migration

Overview

Thirty libraries moved bibliographic data from their old system to the new. Some moved existing data and then overlayed with full MARC records, especially those that had had only a circulation system with brief records. Twenty-two libraries migrated patron data. Transferring these data was not necessary for academic libraries that load new student information every semester. Other libraries had little faith in their existing patron database and used the opportunity to clear the deadwood from the file and accustom their staff to the system by inputting patron data. Transaction, or circulation data, along with associated fines and fees, were the least likely to be moved, attempted by only sixteen libraries. Many libraries chose instead to run the two systems in tandem, checking out on the new system and checking in under the old.

Some libraries forgave old fines with the new system; others had amnesty days for return of materials. Two-thirds of the libraries that transferred data moved everything they expected to move. Some libraries had to use a third-party vendor for conversion, since their new vendor (the same in every case) did not provide these services. One public library successfully contracted their conversion with another library that had already migrated to the same vendor.

Problems

Libraries faced many of the same problems with data migration described by Epstein and would certainly agree with her warning that "it is vital that extreme care be taken in migrating the data from one system to another."[3] Some problems encountered are described below:

- Libraries had great difficulty with bibliographic data if they were migrating between systems that treated multivolume information very differently. Generally, these problems had not been anticipated before migration. In one case, one vendor attached all volume records (in a multivolume set) to the title record,

and the other vendor created new bibliographic records for each volume.

Another library described their former vendor's policy of using three different types of records to store data. Each title had a title record, an item or copy record, and a volume record. For some titles—sets of encyclopedias, for example—all three records would be utilized (as in "*World Book*, Volume 1, Copy 2"). The new vendor supplied two types of records—title and item/volume. Moving from three records into two proved challenging.

A third problem resulted from the limit set on the number of volume records that could be associated with a particular bibliographic record, illustrated by the following comment:

> Every volume was attached to the bibliographic record, but only so many volumes could be added before a new title record had to be created. In the transfer, when we filled up one bibliographic record on the new system, the second record with the rest of the volumes [on the old system] disappeared.

- Withdrawing from a consortium can be complicated, and one library had trouble getting their transaction information from the consortium they were leaving.
- Non-MARC data caused frequent problems; one-third of the respondents mentioned difficulties with either item, patron, or non-MARC bibliographic data. A lack of standardization in structure or difficulty in outputting these data from the old system resulted in loss of data, time delays, and incorrect transfer.
- Vendors built up a variety of expectations concerning data transfer. One vendor stated up front that they would not move data and provided the name of a third-party vendor. A few years later, after some successful migrations, the same vendor told another library that they could move all the data but instead, as the library pointed out, "ended up with lots of garbage."

Some vendors seemed adept at convincing libraries that their difficulties with data transfer were minimal. For example, some libraries termed their transfer "very successful," yet pointed out that they had to input all item information manually. Others noted a loss of thousands of bibliographic or item records in the transfer yet maintained that the transfer was a success.

- Librarians often did not fully understand the data file structure and the way that data were mapped into the new system. Thus, many libraries made indexing and migration decisions without a full grasp of the workings of the new system.
- Given the difficulty of the experience, a few libraries felt that they should never have attempted to transfer transaction or reserve (hold) information.
- Data entry in the old system created problems with data transfer. As one library noted, "Don't take your staff's word when they say they have entered data one way consistently . . . do more testing of the data as it comes over [to the new system] before pulling over all the data."
- Partial records and incorrect information in the old system caused additional concern. A library cautioned, "Take your time. Our database was in a mess to begin with. [We had a] big problem in not knowing whether the books were actually on the shelf. If we had had time to do an inventory and clean up records it would have been better."
- Contracting with a conversion vendor different from the old or new vendor sometimes caused confusion. One library mentioned that they should have chosen a new vendor that would do the conversion themselves, rather that using a third party.
- Price should not be the determining factor when choosing a retrospective conversion vendor. One library that contracted for full MARC records with a low-bid conversion vendor later regretted this decision, given the quality of the resulting database.

Hardware

We investigated the reasons libraries opted to retain their old hardware or to purchase new equipment. Most chose hardware recommended by the new vendor to support the new software. On the other hand, more than one-third saved money by continuing to use old peripherals such as terminals, printers, or lightpens; in retrospect three of these would have preferred to purchase all new equipment. Only one library retained most of their old equipment after the migration. Two retained the same hardware vendor. These same libraries were the only ones for whom hardware played a major role in the selection of a new system.

Other libraries pointed out that, while older hardware was proprietary in nature, the new software ran on an open operating system

such as UNIX. One library observed that the ALA character set terminals for public use were an unnecessary expense. As soon as the warranty period ended, the terminals started breaking down, and replacement and repair costs were almost equal. For the amount of use the ALA character set received, they felt that they should have bought cheaper ASCII terminals for the public. Two libraries would have preferred more terminals for staff and the public at their busier locations to smooth workflow. One pointed out, "The better the system, the more terminals you need."

Two opposing views of hardware procurement surfaced: "[I] shouldn't have bought the new vendor's equipment in the first place; I should have bought and maintained it locally" and, "It's better to depend on one vendor to take responsibility for both hardware and software." Libraries with computer expertise and local data processing departments were much more interested in maintaining their own hardware. Most public libraries relied heavily on vendor support of both hardware and software and were happy to do so.

Telecommunications

Eighty-five percent of all respondents upgraded telecommunications equipment during or after migration. For two libraries this upgrade meant simply adding a port for dial-in use. The rest instituted major changes, such as installing a campus or systemwide network, going from analog to digital lines, doubling or quadrupling the size of their system, or adding connections to a CD-ROM network. Many of our respondents had stayed with their first system so long that changes in the area of telecommunications were made necessary by advancements in technology.

Site Preparation

Recabling was necessary with the new system for more than half of the libraries, since the old cabling was inadequate. Some installed improved cabling or a new local area network (LAN); for others, new library buildings or computer rooms necessitated the change. Most of the remaining libraries added significantly to the existing cabling to accommodate additional terminals.

Labeling

Barcode labels were the norm in twenty-eight libraries. Of these, three changed to barcode labels from optical character recognition (OCR) due to better technology in that area. A few libraries stayed with OCR, although one of these is relabeling now. The tendency toward barcode technology for our entire marketplace seems to be borne out in this small sample.

TRAINING

Training for library staff proved to be a problematic part of migration. Although 67 percent of the libraries rated vendor training as very good or excellent and 94 percent reported that staff adjusted very well to the new system, participants qualified these ratings by immediately enumerating problems and frustrations encountered. Aspects of training provided lengthy responses and detailed advice on "how we would do it differently if we could do it all over again."

Objectives for Retraining Staff

A contributing factor to problems encountered in vendor training may have been the absence of specific objectives for retraining staff. "We just wanted to get everyone trained" was a typical response to our question on this topic.

A few participants reported more detailed objectives, for example: (1) Emphasize similarities and differences between the old and new systems in order to reduce confusion, or (2) Make clear the integrated nature of the new system which requires better communication between departments, as staff members are no longer working in isolation.

Training Methodologies for Staff

Twenty-five of the libraries reported that their vendors had trained selected staff members who in turn trained others; the remainder reported that the vendor trained everyone on the staff simultaneously. The latter group consisted of libraries ranging in size from five to two hundred staff members. Libraries under severe time constraints described training in terms of a "rush job" or a "big hurry" and no doubt would be first to admit that their situation had not made for an ideal training environment.

Vendor training was geared to first-time users in 70 percent of the libraries, although many reported that the vendor was able to move faster or skip the basics because the staff was already knowledgeable. Most of

the remaining libraries reported standard training directed to staff already familiar with an automated system. Four libraries required customized training that employed comparisons with the old system or emphasized specific functions. They felt that the *library* should dictate to the *vendor* how training should proceed, not the reverse.

Responses to the question, How long did staff use the new system before the public began? varied from no time to one year. Many libraries (42 percent) had at most a few hours to use the system in advance of the public. Comments included:

> No one had a heart attack; we were very highly motivated as we had been so frustrated with the old system.
>
> The director insisted on no delay as we had been down for so long. So the public terminals went out at the same time as the staff terminals. The staff *hated* this.
>
> The patrons sometimes knew more than the staff.

In fact, one-quarter of the libraries felt that staff should have been trained longer before the changeover; they were nervous when patrons began. A fortunate 30 percent used the new system for up to two months before the public; this interval seemed optimum.

Relatively few (18 percent) reported the rewriting or alteration of vendor documentation to fit local needs, although in some cases the library staff rewrote the documentation because they considered it confusing and of poor quality.

Follow-up training at a later date proved valuable, since problems always arise after the initial trainers have left; some libraries reserved a portion of their total training allotment for this purpose. Some felt that at least a month should elapse before the first return visit. Similarly, refresher courses for system upgrades are critical.

One administrator justified creating a new training position on the staff by stating:

> It kept me sane! People were worried and anxious and wondered about implications for their jobs; thus they really needed the trainer. After the vendor goes away, you need to make decisions, change workflow, etc. For months the staff is learning to use the new system.

In other libraries staff were assigned to permanent training groups in areas such as technical services. Such groups took responsibility for continued training in their area, which might include, for example, simplifying procedures with "cheat sheets."

One-on-one assistance, particularly feasible in small libraries, proved invaluable when staff first began using the system. The administrator for automation could "make the rounds, helping people individually, reviewing commands, making sure they could place holds, etc." Another valuable approach was to assign people to work in pairs so that they could quiz each other on the system.

Problems with Vendor Training

Automation administrators described the following problems:

- Wrong module or wrong emphasis used by vendor, e.g., wrong type of library, emphasis on software to the exclusion of hardware features, or supervisory versus front-line slant. Many described "canned, inflexible training" not customized for the particular situation or performed at the wrong level.
- Variations in quality among modules, due to specific background of the trainer or his/her lack of knowledge
- Inadequate coverage of little-used features resulting in underutilization of the system
- Vendor's lack of preparation for training, e.g., could not load data or system parameters not set up in advance
- Poor timing of the training or inadequate time allotted
- Lack of comparisons with the previous system
- Inadequate training database that did not represent problems encountered with the real database after trainers had left
- Poor documentation and training materials

These problems suggest improvements in vendor training that can be achieved by precise specification of requirements during negotiations. These requirements should address the size, complexity, and adequacy of the training database; the competence and background of the trainer in terms of specialties needed by the library; the match between the vendor's assumptions and priorities and those of the library; the quality of the documentation; the level of training required and the relevance of the training to the library; and the pace and timing of the training as well as

the number of days needed. Requirements should be specified clearly in writing.

Discussions with other clients of the vendor may provide valuable, firsthand analysis of experiences and suggestions for avoiding pitfalls. Participants in this study certainly had no hesitancy in pointing out explicit shortcomings of vendor training.

Retraining the Public

Half of the libraries saw no need to institute formal retraining for the public; the staff simply answered questions as they arose. Those with a previous OPAC assumed some degree of computer literacy on the part of the public, and most reported that users found the menu-driven, user-friendly systems easy to learn. One automation administrator was of the opinion that "the more stuff you have lying around the terminal explaining use, the longer it takes for people to figure it out."

New handouts, flyers, and "tip sheets" were produced by 55 percent of those interviewed, who reported that this approach to retraining was quite satisfactory. On the other hand, libraries offering group orientation (36 percent) found it unsuccessful. Attendance was low except when it was required for a class, faculty were uninterested in participating, and generally such training seemed superfluous. One library reported the successful use of volunteers from the community to assist the public—a good public relations move, as the volunteers were very enthusiastic and felt involved with the library.

The great majority of respondents reported that users accepted and adjusted to the new system very well:

> Before Christmas we had the card catalog and afterward the OPAC; the public was forced to jump right in. They loved it and found it easy.

Other users need a more gradual transition:

> We made it easier for some of the faculty by offering them the cards from the card catalog in their area.

In a few cases, however, retraining the public was not a success. Patrons were not given enough information, which made them "irate and frustrated." One automation administrator stated:

> I should have put a gun to the back of the librarian's head and *made* staff stand by the public access terminals; users wandered around complaining while librarians sat behind the desk. The public was left in the lurch. Even the vendor asked, "Why don't the librarians help the users?"

PUBLICITY

Promotion to the Public

Participants in the study enthusiastically described publicity for their new systems, which was directed toward their clientele.

Figure 3 illustrates types of publicity employed. Ranging from gala parties and television announcements to new bookmarks, publicity assumed considerable importance to 73 percent of those surveyed.

A special committee for publicity in one college library planned a major celebration for their new OPAC.

> When the PAC was brought up, everyone was there. We had T-shirts, the school mascot, sports teams, the vendor, and IBM. Campus television covered it, and a local radio station broadcast from the library most of the day.

Another library hosted a formal ball the night before the new building's opening, nicely coinciding with the installation of the new system. All the town's big shots attended. A second party the next day was held for the "little shots."

The reasons given by the 27 percent of the participants who elected to have little or no publicity frequently revealed experiences many would just as soon forget. The old maxim "Once bitten, twice shy" applies to those who "didn't want to mention it until we were sure it would work" or who felt that "we didn't want to brag for fear of getting expectations too high."

Promotion to Staff

As opposed to libraries installing their first automated system, migrating libraries have staff with automation experience. That experience, often unfavorable, made publicity unnecessary in the views of the great majority of the system administrators. One pointed out, "It was completely self-evident; the staff had complained about the old system for years." "The staff knew the rationale; they were tired of hand-writing circulation slips and taking the system down to do reports," said another. Occasionally, the schedule for the changeover allowed no time for staff publicity, given an extremely adversarial relationship with the

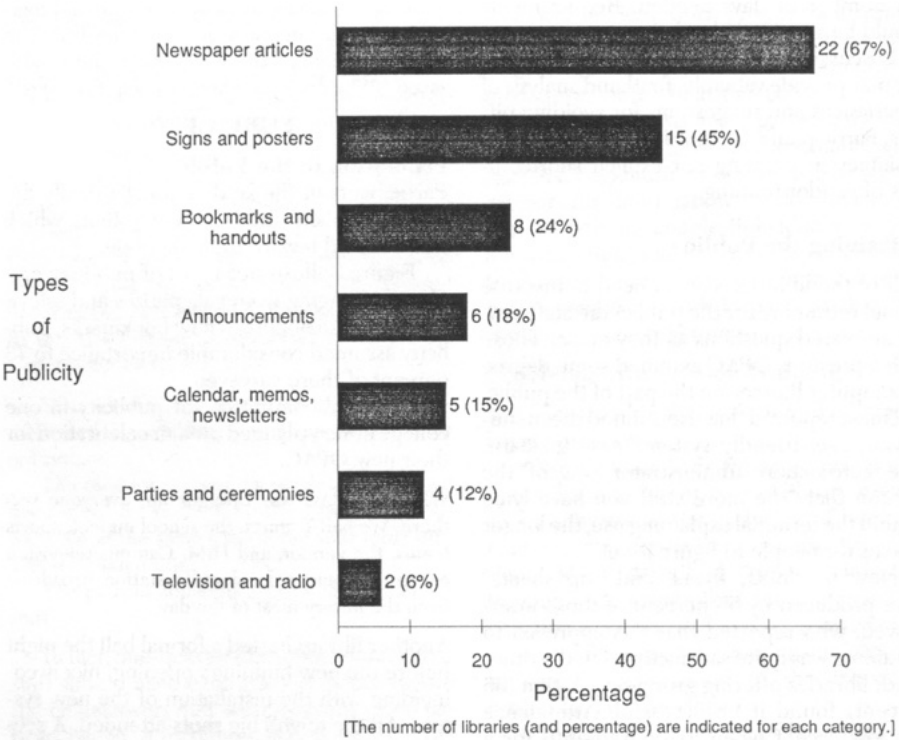

Figure 3. Publicity Used by Libraries.

former vendor. "With the possibility of impending litigation," one administrator recalled, "we had to keep quiet and move fast."

One library that held structured discussions on "what a new system means and why we need one" found the process intensive, accompanied by large meetings and lots of input from staff. They also produced a video for staff on "how life would change after the new system."

Success of the Publicity

Of the libraries conducting publicity, 86 percent were pleased with the results and felt it was successful. A few participants mentioned, perhaps inevitably, some negative feelings, a touch of fear, an undercurrent of uncertainty, or some resistance from the public. The publicity in one public library was "too good—the public had *very* high expectations."

Choosing a New Name

Opinions varied widely over the issue of choosing a new name for the new system. Half the libraries had no names at all for new or old systems, mentioning potential legal ramifications, opposition from the administration, or lack of time. Some libraries liked the notion of keeping the same name in order to maintain consistency in publicity, although one administrator was of the opinion that using the old name followed by a "II" sounded like "a second movie not as good as the first by the same name."

Ten libraries chose new names. Some appointed committees to work on the project; others held contests to name the new system.

Doing It Differently Next Time

A large majority of those in the study were happy with the way they had conducted publicity and would change nothing if they were to do it over. A couple of libraries, however, would have preferred less publicity for patrons in order to "try to keep expectations in line." Others felt they had missed a good opportunity:

We should have made a big PR deal with balloons and banners; we *need* PR.

We should have advertised more and had press coverage; we didn't want to make a big deal to the public in case questions were raised about money, but we lost an opportunity to blow our own horn.

Apparently it is difficult to strike the perfect middle ground.

RELATIONSHIPS WITH VENDORS

In this section we examine the library's relationships with the former and current vendors, noting particularly the effects of previous experiences on current vendor-library interactions. In a group of libraries that has recently migrated, one might naturally assume that relations with the previous vendor were strained. Although true for the most part, more than one-quarter of the participants in the study characterized this relationship as warm. These opinions tended to reflect situations in which the vendor had gone out of business, leaving behind satisfied and sympathetic customers.

At the other end of the spectrum, one-quarter described an adversarial relationship, while the remaining 50 percent felt indifferent or cool. The attitudes of some libraries varied depending on the division in question within the company—cordial toward the support staff, for example, but adversarial toward management, which was associated with financial disagreements.

As they entered into negotiations with the new vendor, 79 percent of the participants anticipated a more positive relationship. Most were not disappointed, but five of the twenty-six libraries in this category expressed problems with their current situation. Comments included:

After the vendor gets a check they tend to quit.

I learned to yell and they learned to jump.

They are very different in their approach than the old vendor; it has taken some getting used to.

Of particular relevance to this study was the majority's opinion that experiences with their previous vendor had indeed colored their attitude toward the new one. They felt themselves to be more cautious and less trusting, accompanied by a "show-me" attitude. Or they had hired a consultant for the first time. As one administrator put it:

We had gotten so burned that we were very businesslike toward _____. We had a lot of apprehension as to what we were signing on to. We really concentrated on the contract—spent five months and got everything in it with a really major legal effort. We brought in city attorneys, consultants, etc.

Goodyear has compared changing vendors to divorce and remarriage, and several administrators also mentioned this analogy.[4] One explained, "When things go wrong we tend to say, 'That's what happened with the old vendor, and now it's happening again.' " Another cautioned against drawing comparisons at every step of the implementation process with "things that drove you crazy with the old vendor. You just have to put it behind you and go on."

Twenty libraries said that their relationship with the new vendor had changed since the new system was installed, in only five cases for the better. Most characterized the change as "just different," rather than substantive, and often found it associated with the growth of the company and of the industry in general. A more formal relationship develops as the company becomes larger. For some, their present situation would never be as good as with the old vendor. Gone are the days of lengthy chats with the president when extra training would be thrown in at no cost and when "you always talked to a human who could answer your question instead of leaving a message with a computer." Nostalgia for certain vendors was a thread running through many conversations.

We expected _____ to be as responsive and as gentlemanly as _____ [a company now bankrupt]. They did backups for the library—they did everything for the customer. We were naive. Now, if it's not written down, we don't get it.

Advice to Others

One-third of the libraries had ideas for improving the vendor-library relationship when asked what they would have done differently:

1. Ask questions up front, and gather as much information as possible. Vendor demos are inadequate, and time should be allowed for personal visits to libraries that have installed the system.

2. Don't take the salesman's word for anything. Get everything in writing and demand proof—that the vendor will be able to migrate the data, for example.

3. Tie specific needs to contract specifications.

4. Don't be overly influenced by problems with the old system; one library "focused too much on a few areas rather than the big picture."

5. Insist that the vendor be realistic, rather than "promising the moon."

The bottom line is that clear communication is necessary to avoid false assumptions and misunderstandings.

CONCLUSIONS

Overall, many challenges occurring in a migration are similar to those of an initial implementation. The difference seems to lie in the library's current point of reference, which is based on past automation experience, for good or ill, and on expectations of better things from a new vendor. Assuming that the new vendor will rescue the library from its present condition can be the Achilles' heel of migration. On the other hand, many libraries approached the process with objectivity and realistic expectations.

At our request, system administrators offered advice to those contemplating a new system. Most comments centered on the data transfer process, that aspect of automation unique to migration and the most problematic aspect of the changeover.

If the library has not conducted an inventory recently, the automation administrator should consider undertaking this procedure in preparation for the second system. Although libraries with large collections may view an inventory as insurmountable, ideally the present system should expedite this endeavor. As is the case with a retrospective conversion process in a library automating for the first time, incorrect status of items in the collection is misleading and frustrating to users.

The more thoroughly the library understands the way both the new and the old systems handle and map data, the better the chance of success. Although the schedule may be tight, learning the details is worth the time required. As data transfer begins, the library should make frequent tests of the way these data are appearing on the new system. Have all the fields mapped as expected? Are the indexes building according to your request? Respondents agreed that the library's database is of primary importance and suggested three especially critical points:

1. Keep a written record of how data are entered on the system; do not rely on the staff's memory of how things were done.

2. Be consistent in entering data.

3. Remember that moving standard MARC data is easier than moving locally defined data.

Many libraries reiterated that data transfer will take longer than expected. Plan adequate time for the transfer. Do not be discouraged if the schedule slips, and keep a positive attitude. Hayes and Belastock emphasize that attitudes and expectations are crucial issues in any successful automation project.[5]

Involve staff as much as possible. Even libraries that conducted successful projects regretted not including staff more extensively in the planning and implementation process. Staff involvement offers a further opportunity to reexamine library policies and procedures for possible change.

Allow time for staff to become thoroughly familiar with the system before making it available to the public. Many libraries advised running old and new systems in tandem, if possible.

Vendor relations figured strongly in the advice of libraries that have migrated. Assume the same businesslike stance with the vendor as the vendor does with the library, at the same time remembering that you have chosen to enter a partnership with this vendor. Take time to develop a strong contract and understand thoroughly what the vendor is proposing. Terminology and expectations can easily be misunderstood. Steps in the project and expectations should be stated clearly in writing so that there is no confusion for either party. Talk to other migration clients of the vendor and solicit advice. One administrator was of the opinion that a successful migration is as much the responsibility of the library as the vendor. At the same time remember that there is no perfect system, and with turnkey system benefits come turnkey system compromises.

Finally, maintain perspective on the process. Many libraries have made it through migration successfully and have lived to share their experiences with others. With careful management, a proven vendor, and a positive

attitude, migration is an undertaking well worth the effort.

ACKNOWLEDGMENT

We wish to express our deep appreciation to the vendors who supplied the names of their customers and to the automation administrators of the libraries listed in appendix A. Without their cooperation and assistance, this research could not have been undertaken.

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APPENDIX A.
LIBRARIES PARTICIPATING IN THE STUDY

Amelia Gayle Gorgas Library
University of Alabama
Tuscaloosa, Alabama

Arlington Heights Memorial Library
Arlington Heights, Illinois

Brevard County Library System
Coco, Florida

Charlotte-Mecklenburg Public Library
Charlotte, North Carolina

Darien Library
Darien, Connecticut

Elk Grove Village Public Library
Elk Grove Village, Illinois

Everett Public Library System
Everett, Washington

Fondren Library
Rice University
Houston, Texas

Fort Worth Public Library
Fort Worth, Texas

Framingham Public Library
Framingham, Massachusetts

Greensboro Public Library
Greensboro, North Carolina

Greenwich Library
Greenwich, Connecticut

Ida Jane Dacus Library, Winthrop College
Rock Hill, South Carolina

Kansas City Public Library
Kansas City, Missouri

Memphis-Shelby County Public Library
and Information Center
Memphis, Tennessee

Middle County Public Library
Centereach, New York

Mortveldt Library
Pacific Lutheran University
Tacoma, Washington

Multnomah County Library
Portland, Oregon

New Orleans Public Library
New Orleans, Louisiana

Nicholson Memorial Library
Garland, Texas

North York Public Library
North York, Ontario

Norwalk Public Library
Norwalk, Connecticut

Palm Beach County Public Library System
West Palm Beach, Florida

Spartenburg County Public Library
Spartenburg, South Carolina

Ralph W. Steen Library
Stephen F. Austin State University
Nacogdoches, Texas

San Diego State University Library
San Diego, California

Swirbul Library
Adelphi University
Garden City, New York

Tempe Public Library
Tempe, Arizona

Texas A&M Medical Services Library
College Station, Texas

Thomas P. O'Neill Jr. Library
Boston College
Chestnut Hill, Massachusetts

Tipton County Library
Tipton, Indiana

Torrance Public Library
Torrance, California

Learning Resources Center
Uniformed Services University of the Health Sciences
Bethesda, Maryland

Communications

Bound Withs versus an Online Catalog: A Practical Solution

Patricia I. Ballard

Bound withs *make up a small percentage of most libraries' collections, yet cataloging them fully takes an inordinate amount of time. In the pretechnology era, each title in a* bound with *volume had a full bibliographic record linked by With notes to the other titles in the bound with volume. With the advent of online catalogs and circulation systems arose problems of automated bibliographic and circulation control. Solutions to these problems as described by several libraries attending an Innovative Interfaces Users Group meeting are explored. A resolution, based on the brainstorming done at that meeting and on the Washington State University Library's online catalog's handling of* bound withs, *is proposed. The solution devised by Innovative Interfaces in an upcoming release of the Innopac software is explained.*

Dacus Library at Winthrop University (formerly, until July 1, 1992, Winthrop College) is a medium-sized academic library of approximately 350,000 volumes, with a staff of thirty-two, fourteen of whom are professional librarians. In 1986, the library purchased the Innovacq Acquisitions and Serials Control System from Innovative Interfaces of Berkeley, California. In 1989 the library added Innopac, the same company's online public catalog, along with its circulation module. The system, called DOC (for *D*acus *O*nline *C*atalog), was installed in June 1989 and introduced to the students, faculty, and staff in January 1990.

PAST PRACTICE

Between the loading of OCLC bibliographic record tapes and circulation tapes from a previously used online circulation system and DOC's introduction to the college community, much cleanup work had to be accomplished. One of the problems discovered during that time was that of monographic *bound withs*. The *ALA Glossary of Library and Information Science* defines *bound withs* as "One of two or more bibliographically independent books or pamphlets which have been published separately and subsequently bound together."[1] In the past (pre-DOC), Dacus followed the applicable rules in the first and second editions of the *Anglo-American Cataloguing Rules* to make separate bibliographic entries for each title contained in the physical piece, linking the entries together by means of "With" notes.[2] The library's holdings symbol was placed on all relevant records on OCLC. This practice worked well in a card catalog, giving the patrons complete bibliographic information on each title in the piece. However, now that Dacus Library has an online catalog linked to an online circulation system, a combination of past practice and the inability of the system to link one barcode to more than one bibliographic record is causing difficulties.

STATEMENT OF PROBLEM—ONLINE

A public access bibliographic (or bib) record on Innopac shows not only bibliographic information, but also circulation information, which comes from the item record attached to the bib record (see figure 1). A status box in the lower middle of the screen gives location (GENERAL COLLECTION, OVERSIZE, REFERENCE, etc.), call number for that location, and status (AVAILABLE, DUE DATE, LIBRARY USE ONLY, etc.). The circulation module depends upon there being a unique barcode for each copy of a title to attach to a bib record.

Since all bib records on OCLC linked by With notes had the library's holdings symbol (SWW) attached to them, all of these bib records were loaded into DOC. There is,

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```
CALL #          Z250 .L13 1988
LOCATIONS       GEN COLLECTION

AUTHOR          Labuz, Ronald, 1953-
TITLE           Typography & typesetting : type design and manipulation using
                  today's technology / Ronald Labuz.
IMPRINT         New York : Van Nostrand Reinhold, c1988.
DESCRIPT        272 p. : ill. ; 29 cm.
NOTE            Includes index.
                Bibliography: p. 261-266.
SUBJECT         Type and type-founding.
                Printing, Practical --Style manuals.
                Type-setting.

    LOCATION        CALL #                                  STATUS
1 > GEN COLLECTION Z250 .L13 1988                          DUE 04-25-92

R > Browse Nearby Entries          S > SHOW items with the same SUBJECT
N > NEW Search                     P > PRINT
A > ANOTHER Search by TITLE
Z > Show Items Nearby on Shelf
Choose one (R,N,A,Z,S,P)
```

Figure 1. Non-Bound With Public Access Record on DOC, Showing Status Box with Circulation Information.

however, only one barcode for each physical piece and it is attached to only one of these bib records, generally the bib record matching the first title in the piece. The bib records for the other titles in the piece have no status boxes at all, which is confusing to the patrons. When the one barcode is checked out, only its attached bib record shows a status of <DUE DATE>; since the other records have no status boxes, no one can tell from DOC if the library really has a *bound with* title available on the shelf or if it is checked out. This situation defeats the purpose of having an online catalog, which is supposed to supply complete circulation information.

POSSIBLE SOLUTIONS

It was mentioned earlier that there should be a unique barcode for each copy of a title in Innopac. It should also be said that Innopac recognizes duplicate barcodes, listing them as such on a daily report, and will allow them to exist in the system. An experiment was attempted whereby the same barcode was entered into the item records for two titles in a *bound with*. When checkout was tried, it failed; since the barcodes were identical, the system could not decide which one to check out, so neither title was checked out.

Another possible, more physically radical, solution is to separate the titles in the piece and rebind each one individually. This would probably take more time, effort, and money than it is worth. If it were done in-house, costs to be considered include personnel time and the materials needed. If the library sent the *bound with* to an outside bindery, costs here would be in the same categories as above, but would most likely be higher than those for in-house rebinding. There could also be preservation factors involved in a decision to rebind; e.g., is the piece in such condition that rebinding it would be more harmful than leaving it alone?

At the 1991 American Library Association Annual Conference in Atlanta, this author chaired a small group discussion on *bound withs* during the Innovative Interfaces Users' Group meeting. The number of people who joined in the discussion was somewhat surprising, and several were very vocal about the solutions reached by their libraries.

One method of solving this dilemma mentioned at the discussion is to put as many barcodes on the piece as there are separate titles in it and to attach each barcode to the bib record for each title. This may serve well for other libraries, but for Dacus it was felt to be impractical. At checkout, all the barcodes might not be scanned by the laser; therefore, all the titles in the piece would not be checked out, only some of them would be. Some titles would then appear to be available when they were, in fact, not. If the piece became overdue, the circulation module would generate multiple overdue notices (and calculate mul-

```
 B2399714              Last updated: 12-10-90 Created: 05-18-89 Revision: 4
01 LANG: eng       04 COPIES: 1       06 CAT SOURCE: d    08 FREQUENCY: -
02 SKIP: 0         05 CAT DA 06-01-89 07 BIB LEVEL: m     09 COUNTRY: nyu
03 LOCATION: genco
10 001      10096798
11 008      831104q18901899nyuf     a      00001 eng dnamI
12 040      Recon SWW|cSWW
13 049      SWWW
14 090      PR4967|b.H6x
15 100   10 MacDonald, George,|d1824-1905
16 245   10 Home again /|cby George MacDonald.
17 250      Authorized ed.
18 260   0  New York :|bG. Routledge,|c[189-?]
19 300      313 p., [1] leaf of plates, 297 p. ;|c20 cm.
20 505   0  Home again -- The flight of the shadow. 1891.
21 740   01 Flight of the shadow.

To modify a particular field, Key its number
I > INSERT a Field     D > DELETE a Record     A > ATTACH a New Record
Z > MOVE Fields        S > Record SUMMARY      O > OTHER options
Choose one (01-21,I,Z,D,S,A,W,R,Q,O)
```

Figure 2. Bound With Staff Access Record, Showing Publication Date in Contents Note (505 Field).

tiple fines), but only for those titles that had actually been checked out. Even if all the barcodes were checked out properly and the piece did not become overdue, all the barcodes might not be checked in when the piece was returned, thereby generating false overdues and fines (and a justifiably irate patron).

Another way of coping with *bound withs* on Innopac is to attach a single barcode to the first title in the piece and give subsequent titles bibliographic and item records, but no barcodes. The bib records for the subsequent titles would have local notes (OCLC-MARC tag 590) instructing the patron to see the bib record for the first title for circulation information. This method was also felt to be unworkable at Dacus; since the 590 field appears near the end of the record, most patrons would not even see it, as they tend not to read much beyond the first screen.

A third method of dealing with this problem is to attach one barcode to the first title, as above, and place a status code in the item records for the subsequent titles that tells the patron to check at a reference or circulation desk because the title on the screen is a *bound with*. A typical library patron would not, and should not be expected to, understand this terminology; it may even be enough to discourage him or her from pursuing further inquiries, as most people are reluctant to approach a public desk and admit their ignorance.

SOLUTION USED BY DACUS LIBRARY

The solution decided upon by the library, although not happily, is as follows:

One barcode is placed on the piece; one item record is created. The OCLC bibliographic record matching the first title in the piece is used for copy cataloging and is exported to DOC after editing. If the record selected is linked by With notes to other bib records, those other records have the library's holdings symbol attached to them for interlibrary loan purposes but are not exported to DOC. A contents note (505 field) is added to the exported record for all titles in the piece. If author and publication data for those titles differ from those in the 100 and 260 fields, this information is added in the 505 field (see figure 2). Appropriate subject headings are given to cover all titles in the piece, up to the limit of the size of record that DOC can accept.[3] Subject headings sometimes have to be deleted in favor of complete contents and added entry coverage for authors and titles. Author/title (700 field with subfield t) or title (740 field) added entries are made for local access. 700 fields with subfield t's are made if titles in the 505 field have authors different from that in the 100 field. 740 fields are made

```
 B1859936              Last updated: 02-03-91 Created: 05-16-89 Revision: 4
01 LANG: eng        04 COPIES: 1        06 CAT SOURCE:      08 FREQUENCY: -
02 SKIP: 2          05 CAT DA 06-01-89 07 BIB LEVEL: m      09 COUNTRY: nyu
03 LOCATION: genco
10 001      3346781
11 008      771017s1906     nyua     a      00011 eng  namIi
12 040      DLC|cKJC
13 049      SWWW|c:3 1410 00105 6526
14 090      PS1702|b.K57x
15 100   10 Fox, John,|d1863-1919
16 245   12 A knight of the Cumberland ; Hell-fer-sartain /|cby John Fox, Jr.
17 260   0  New York :|bGrosset & Dunlap,|cc1906
18 300      273 p. :|bill. ;|c20 cm
19 740   01 Hell-fer-sartain.
```

```
To modify a particular field, Key its number
I > INSERT a Field     D > DELETE a Record     A > ATTACH a New Record
Z > MOVE Fields        S > Record SUMMARY      O > OTHER options
Choose one (01-19,I,Z,D,S,A,W,R,Q,O)
```

Figure 3. Bound With Staff Access Record, Showing All Titles in 245 Field and Continuous Paging in 300 Field.

if titles in the 505 field have the same author as that in the 100 field. Both contents and added entries are made so that patrons can find the titles they are seeking whether they search in the title index (245 field, subfield t of the 700 field, and the 740 field) or the keyword index (245, 505, 700 subfield t, and 740). To have only added entries without the antecedent of a contents note could be confusing.

If the record used for copy cataloging is a "unit" record, i.e., one with all titles in the piece already recorded in the 245 field, and there are no other bib records on OCLC that match the other titles in the piece, this record has the library's holdings symbol attached to it and is exported to DOC (see figure 3). No 505 field is added, since the titles are already given in the 245, and the 245 is indexed in both the title and keyword indexes. Subject headings are added, if they are needed and are not already present, to cover all titles in the piece, as above. Added entries are made as above, again if they are not already present.

The library at Kalamazoo College followed essentially the same path as Dacus in treating their *bound withs*, with one exception. Finding that the 001 field (OCLC control number) is repeatable on Innopac, Kalamazoo added 001 fields to the Innopac record for all the OCLC records that carried the library's holdings symbol for the titles in a particular *bound with*. Should a *bound with* be withdrawn from the collection, no extra searching need be done to discover the OCLC records that must have the holdings symbol removed from them; the information can be printed out from the Innopac record before withdrawal.

Dacus Library's solution is functional but unsatisfactory at the same time. Adding contents (505), extra subject headings (6xx), and added entries (700 subfield t and 740) to one record can make it exceptionally long, and as noted earlier, most library patrons will not usually look at bib records with more than one or two screens (see figures 4 and 5). (However, if a title or keyword search is tried and results in a bib record that does not show that title or keyword on the first screen, the patron will likely view more of the record to discover why the search produced that particular record.) Also, some information is missing from these records that may be important to patrons, i.e., some of the physical description and the notes fields.

There does happen to exist an easy, simple, and elegant solution to the *bound withs* problem. The online catalog used at the Washington State University Library in Pullman allows the same barcode to be used in each item record for each title in a piece, this barcode functioning as a link from one title to another. The system generates a note when any of the title records is displayed, telling that they are

```
CALL #          PR1109 .O8 1937x
LOCATIONS       GEN COLLECTION

TITLE           An Oxford anthology of English prose / chosen and edited by
                  Arnold Whitridge and John Wendell Dodds.
IMPRINT         New York : Oxford University Press, 1937, c1935.
DESCRIPT        x, 950, xv, 1232 p. ; 25 cm.
CONTENTS        An Oxford anthology of English prose -- An Oxford anthology of
                  English poetry / chosen and edited by Howard Foster Lowry and
                  Willard Thorp.
SUBJECT         English literature.
                English poetry.
OTHER AUTH      Whitridge, Arnold, 1891-

    LOCATION        CALL #                          STATUS
1 > GEN COLLECTION PR1109 .O8 1937x                AVAILABLE

M > MORE BIBLIOGRAPHIC Record     A > ANOTHER Search by TITLE
R > RETURN to Browsing            Z > Show Items Nearby on Shelf
F > FORWARD browse                S > SHOW items with the same SUBJECT
N > NEW Search                    P > PRINT
Choose one (M,R,F,N,A,Z,S,P)

---------------------------------------------------------------------

OTHER AUTH      Whitridge, Arnold, 1891-
                Dodds, John Wendell.
                Lowry, Howard Foster, 1901-1967.
                Thorp, Willard, 1899-
OTHER TITLE     Oxford anthology of English poetry.

    LOCATION        CALL #                          STATUS
1 > GEN COLLECTION PR1109 .O8 1937x                AVAILABLE

M > MORE BIBLIOGRAPHIC Record     A > ANOTHER Search by TITLE
R > RETURN to Browsing            Z > Show Items Nearby on Shelf
F > FORWARD browse                S > SHOW items with the same SUBJECT
N > NEW Search                    P > PRINT
Choose one (M,R,F,N,A,Z,S,P)
```

Figure 4. Two-Screen Public Access Record for a Bound With.

bound together. If the piece is checked out, appropriate circulation information displays on all records.[4]

Since the Innopac system is reluctant to manipulate duplicate barcodes, a slight adjustment to the Washington State solution would be needed. The bib record for the first title in the piece would have an item record with a barcode attached to it. The bib records for the other titles in the piece would also have item records attached to them, but with no barcodes in them. A horizontal link could be created between the item records without barcodes and the item record with a barcode, so that all records would be checked out and in together (see figure 6).[5] This horizontal link could be a *bound with* code that would be inserted into the item records for the other titles in the piece—perhaps also using a unique identifying number, such as the Innopac bib record number, for the first title in the piece—to point to the correct bib record. Using this method would save time during retrospective conversion; the full bib records linked by With notes could be used without doing extensive editing. And while current cataloging of *bound withs* using the With notes link would still be time-consuming, it is

more important that the patron be able to see the status for any title in a *bound with* piece: AVAILABLE, DUE DATE, etc., would display where there is only blank space now.

VENDOR SOLUTION

Innovative Interfaces is a company that traditionally listens to its customers and tries to provide satisfying enhancements to its products. Release 8.0 of the Innopac software, in beta testing at the time of this writing and due to be installed in libraries later in 1992, has a component that solves the *bound withs* problem in a way remarkably similar to that proposed earlier. The first title in the *bound with* has an item record attached to it in the usual way. A command is available in the Update mode for the item record to link it to additional bib records. With this link command, a note is generated in the item record, where the unique bib record number for each other title in the *bound with* is listed (see figure 7). When the piece is checked out, appropriate circulation information will appear with each linked bib record.

```
CALL #          M1269 .M3
LOCATIONS       GEN COLLECTION

AUTHOR          Hindsley, Mark H. (Mark Hubert)
TITLE           24 formations, designs and entrances for the marching band / by
                  Mark H. Hindsley.
IMPRINT         New York : Remick Music, c1935.
DESCRIPT        27, 32, 30, 30, 35, 35, 32, 32, 32, 32 p. : ill. ; 27 cm.
SERIES          Marching maneuver series ; v. 1-10.
NOTE            Designed especially for school bands.
CONTENTS        24 formations, designs and entrances for the marching band --
                  Practical stunts and evolutions : for band and drum corps / by
                  Claude B. Smith and Wallace Capel. c1936 -- Grooming the

    LOCATION        CALL #                                  STATUS
1 > GEN COLLECTION M1269 .M3                                AVAILABLE

M > MORE BIBLIOGRAPHIC Record       Z > Show Items Nearby on Shelf
R > Browse Nearby Entries           S > SHOW items with the same SUBJECT
N > NEW Search                      P > PRINT
A > ANOTHER Search by TITLE
Choose one (M,R,N,A,Z,S,P)

---------------------------------------------------------------------------

CONTENTS        24 formations, designs and entrances for the marching band --
                  Practical stunts and evolutions : for band and drum corps / by
                  Claude B. Smith and Wallace Capel. c1936 -- Grooming the
                  marching band for high school contests / by George T. Bennett.
                  c1937 -- Required and special maneuvers for high school
                  marching band contests / by George T. Bennett. Chicago : Gamble
                  Hinged Music, c1937 -- Street routines for marching band
                  contests and public exhibitions / by George T. Bennett. Chicago
                  : Gamble Hinged Music, c1938 -- Field routines for marching
                  band contests and public exhibitions / by George T. Bennett.
                  New York : Remick Music, c1938 -- New and novel formations for
                  marching bands and drum corps / by George T. Bennett and
                  Richard N. Whitfield. New York, N.Y. : Remick Music, c1938 --

    LOCATION        CALL #                                  STATUS
1 > GEN COLLECTION M1269 .M3                                AVAILABLE

M > MORE BIBLIOGRAPHIC Record       Z > Show Items Nearby on Shelf
R > Browse Nearby Entries           S > SHOW items with the same SUBJECT
N > NEW Search                      P > PRINT
A > ANOTHER Search by TITLE
Choose one (M,R,N,A,Z,S,P)
```

Figure 5. Five-Screen Public Access Record for a Bound With.

```
                Novel drills and formations for basketball games / by C.R.
                Hackney and Henry McCord. New York, N.Y. : Remick Music, c1939
                -- The "in" and "out" of 26 letter formations / by George T.
                Bennett. New York, N.Y. : Remick Music, c1939 -- Parade stunts
                / by C.R. Hackney and H. Hugh Emerson. New York, N.Y. : Remick
                Music, c1941.
SUBJECT         Bands (Music)
                Drill and minor tactics.
OTHER AUTH      Smith, Claude Bryan, 1905- Practical stunts and evolutions.
                Capel, Wallace.
                Bennett, George Talmage, 1903- Grooming the marching band for
                  high school contests.
                Bennett, George Talmage, 1903- Required and special maneuvers for

   LOCATION          CALL #                              STATUS
1 > GEN COLLECTION M1269 .M3                           AVAILABLE

M > MORE BIBLIOGRAPHIC Record     Z > Show Items Nearby on Shelf
R > Browse Nearby Entries         S > SHOW items with the same SUBJECT
N > NEW Search                    P > PRINT
A > ANOTHER Search by TITLE
Choose one (M,R,N,A,Z,S,P)
```

```
OTHER AUTH      Smith, Claude Bryan, 1905- Practical stunts and evolutions.
                Capel, Wallace.
                Bennett, George Talmage, 1903- Grooming the marching band for
                  high school contests.
                Bennett, George Talmage, 1903- Required and special maneuvers for
                  high school marching band contests.
                Bennett, George Talmage, 1903- Street routines for marching band
                  contests and public exhibitions.
                Bennett, George Talmage, 1903- Field routines for marching band
                  contests and public exhibitions.
                Bennett, George Talmage, 1903- New and novel formations for
                  marching bands and drum corps.
                Whitfield, Richard Noble, 1910-

   LOCATION          CALL #                              STATUS
1 > GEN COLLECTION M1269 .M3                           AVAILABLE

M > MORE BIBLIOGRAPHIC Record     Z > Show Items Nearby on Shelf
R > Browse Nearby Entries         S > SHOW items with the same SUBJECT
N > NEW Search                    P > PRINT
A > ANOTHER Search by TITLE
Choose one (M,R,N,A,Z,S,P)
```

```
                Hackney, Clinton Rudolph, 1905- Novel drills and formations for
                  basketball games.
                McCord, Henry, 1919-
                Bennett, George Talmage, 1903- In and out of 26 letter
                  formations.
                Hackney, Clinton Rudolph, 1905- Parade stunts.
                Emerson, H. Hugh.

   LOCATION          CALL #                              STATUS
1 > GEN COLLECTION M1269 .M3                           AVAILABLE

M > MORE BIBLIOGRAPHIC Record     Z > Show Items Nearby on Shelf
R > Browse Nearby Entries         S > SHOW items with the same SUBJECT
N > NEW Search                    P > PRINT
A > ANOTHER Search by TITLE
Choose one (M,R,N,A,Z,S,P)
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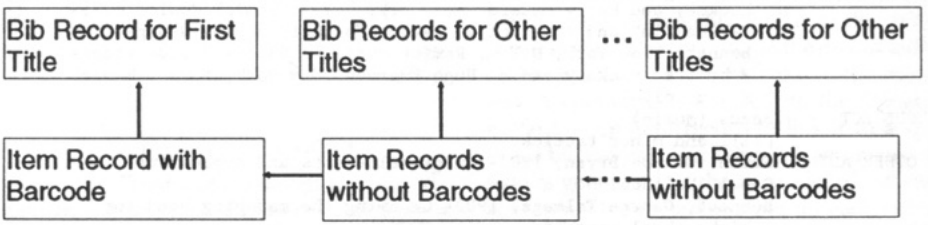

Figure 6. Diagram of Solution Proposed by Participants in Small Group Discussion on Bound Withs.

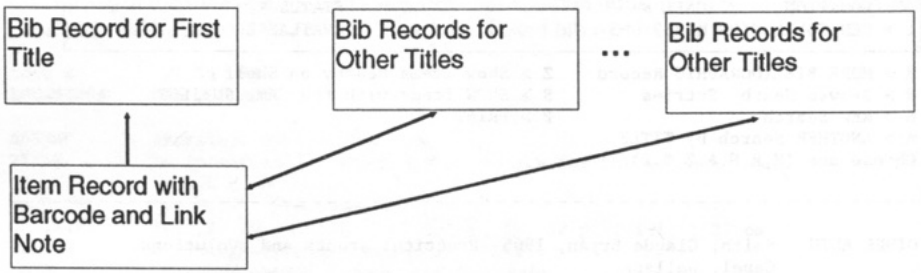

Figure 7. Diagram of Actual Solution Devised by Innovative Interfaces.

CONCLUSION

Bound withs constitute a small proportion of the total collections in a library. Most collections contain them, but most catalogers are reluctant to address the problems they raise, relegating them to the obscurity and neglect of their backlogs because cataloging them completely takes an inordinate amount of time. As libraries continue to install online catalogs and perform retrospective conversion on their collections, more *bound withs* will be discovered. Most likely, each title in these *bound withs* will have had its own entry in card catalogs, linked by *with* notes to the other titles in the piece. The libraries owning these *bound withs* will certainly not be able to afford the time, personnel, or budget to recatalog them in conformity with their particular online catalog's capabilities. A simple solution, such as proposed here and shortly to be available in Innopac, should be available in every online catalog and presents a practical solution to these bibliographic and circulation dilemmas.

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Beta Testing an Integrated Library Automation System

Beverly A. Ryan

The opportunity to become the beta test site for KeyNOTIS™, the turnkey library automation system offered by NOTIS Systems, Inc., was presented to Pfau Library, California State University, San Bernardino, in 1989. There are advantages and disadvantages, as well as risks, for both the vendor and the test site in such an arrangement. The beta test was successful and the product accepted by the library after overcoming many obstacles along the way.

The automation of a library is a very complex task best achieved through careful planning and decision making, involving extensive discussions with vendors, securing generous funding, performing complex file and site preparation, and coordinating by an experienced library automation specialist. In the real world, however, we do not always have the time, money or staff to do a thorough job of preparation and planning. For Pfau Library, the opportunity to be a beta test site both enabled us and forced us to automate without all of the above recommendations being fully met.

WHAT IS A BETA TEST?

Beta testing is the trial use of developmental software or hardware, in the environment for which it was designed, before it is released commercially. Usually beta testing is performed on fully developed, market-ready products after most of the debugging has been done during alpha testing by the development company.[1,2] This article, based on the experience of Pfau Library at California State University, San Bernardino (CSUSB) in beta testing the KeyNOTIS integrated library software, will examine some of the advantages and pitfalls of beta testing and suggest some things to consider before entering into a beta test agreement. It will also make suggestions relevant to the undertaking of any major automation project, whether or not as a test site.

A potential test site must determine that it needs an automated system that can perform certain well-defined functions, and that the product being considered is intended to perform these functions. The site must be seriously interested in the product being considered. The vendor needs to determine that the potential test site has the staffing, facilities, and funding necessary to carry out the beta test and to become a satisfied customer. The vendor should also determine that the product will meet the needs of the potential test site.

There are advantages for both the vendor and the test site in participating in a beta test project. The vendor has an opportunity to find and correct software errors and to get customer feedback on what works well and what needs improvement. Planning for enhancements for the next release of the software is likely to begin during the beta testing phase. The vendor gets feedback on the documentation and training that accompanies the software being tested. Depending on the beta test agreement, the vendor may also receive some prerelease advertising and a demonstration site along with the beta test.

Advantages for the test site include access to new software or technology and the opportunity to be in the forefront of a rapidly changing field. Access to the new software and the beta test experience itself can hold significant learning experiences for staff members at the test site. Additional advantages may include free or discounted hardware or software, and extra support from the vendor during implementation and testing. Although the software will be in its final stage of development, the test site may have some influence on its future development.

There are also disadvantages for the test site that must be taken into consideration. The beta testing process itself takes more time and effort than would be needed during the installation of an established product. There will be some time spent identifying and resolving software errors. Much of this will be done by test site staff working with the vendor over the phone. The beta test site may be under pressure from the vendor to meet short deadlines that would not have been imposed in a nontest situation. (See appendix A for a summation of the pros and cons of beta testing.)

Employee frustration and negativity can be a problem whenever new technology is installed, but with a beta test site, staff may be

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too quick to blame the vendor or the product when problems were actually caused by operator error or inadequate training. It is important for the vendor to respond promptly to problems and determine whether a program error has been discovered or a procedure needs further explanation. It is also important that employees understand what a beta test is and what their expectations should be.

Perhaps the most significant potential disadvantage in becoming a test site lies in the risk to which the test site may be exposing itself. If the product being tested is found to be less than acceptable, the test site faces the decision of beginning the automation project over again with an established product or settling for the tested product because of the time, money, and effort already invested in it. As with any automation project, the ultimate goal is to install the system best suited to the situation in a cost-effective and timely manner.

There are also risks for the vendor in a beta test situation. If the test site selected is unsuitable, it may be unable to carry out the beta testing and implementation of the product sucessfully. Site unsuitability could be caused by staff inadequacies, either in numbers or capabilities, staff hostility, or severe funding problems. The vendor risks damage to its reputation and future sales if the beta test is a failure. If the beta test is successful, the vendor must be prepared to meet market demands and to support a new product.

There are a few additional precautions to be considered in beta test situations. It is imperative that a clear understanding exists of what constitutes a beta test and what the expectations are on both sides, including whether or not the test site can influence the development of the software. This understanding must be communicated to the staff as well as to administrators and the vendor. According to John Nack, president of GUIDE, the IBM user group, "One misconception about beta [testing] is that users think they are going to have the chance to influence the final design of the product. By the time most products get to the field, they are pretty well set. Unless there is a major shortcoming, a single user can't exert much influence."[3] The test site should also be aware of the extent to which it may be used as an advertising or promotional vehicle. These are issues that need to be resolved during pretest negotiations.

THE SETTING

The situation that existed at CSUSB in late 1989 was not ideal for starting a major automation project. The campus had experienced very rapid growth over the last several years. Staffing and facilities had not kept up with this growth, and the situation will not improve for some time. The number of library staff was barely adequate to keep up with existing work without taking on new tasks. At the same time, the state was (and is) having severe budget problems. In spite of this situation, the need for an integrated automated system was apparent, particularly for a new circulation system and an online catalog. The old circulation system had frequent breakdowns and occasional loss of data. The old card catalog was cumbersome, inconvenient, and time-consuming, and our patrons were aware that better methods of finding materials existed and should be available to them.

The library at CSUSB has been using various information technologies since the early 1980s. Cataloging and ILL have used OCLC for many years. We used an automated circulation system from 1983 until recently. The reference staff has been searching online databases for several years, and since 1988, several CD-ROM workstations have been available for patron use. Personal computers have been used by several staff members for various applications since 1987. Even with these systems, we were behind comparable libraries in our level of automation for staff use and service to patrons. The library began investigating an integrated system in the late 1980s but had not begun the RFP process because of the extremely high cost of these systems and the tenuous budget situation.

The opportunity to become the Key-NOTIS beta test site came about in discussions held after NOTIS Systems, Inc., demonstrated the NOTIS Library Management System to the library. NOTIS was looking for a test site for its new turnkey version of the NOTIS software. The NOTIS Library Management System offers a library the ability to customize the system to local requirements, but this requires a programmer to be on staff or placement of the system under the control of the university's computer center. Key-NOTIS does not require a programmer and is able to perform almost all of the functions of the NOTIS Library Management System.

KeyNOTIS was developed for the small to medium-sized academic library and is a complete package, including the NOTIS application software, IBM hardware, and IBM operating system.

Before accepting the KeyNOTIS beta test opportunity, many meetings were held with library administrators and library staff to discuss both the advantages of beta testing an automated system and the difficulties we would face. There was near unanimous agreement by the professional and paraprofessional staff that we could handle the project and that we should take advantage of a chance to automate that might not otherwise arise for several years.

The beta test site arrangement was based on an agreement between CSUSB, NOTIS, and IBM. The software was provided at a reduced price and most of the hardware, including the 9375 minicomputer, was made available by IBM. The library had to find money for site preparation, file preparation, terminals, printers, and other miscellaneous, but significant, expenses.

The KeyNOTIS equipment at CSUSB includes an IBM 9375 computer and console with ninety-six-port capacity, five disk drives, one tape drive, a system printer, and an IBM PS/2 used as an OCLC-KeyNOTIS interface. We are using IBM 3151 monochrome terminals with IBM Proprinters to access the system. Access is also available via the campus data network and by modem. The database has approximately 360,000 bibliographic records and 23,000 patron records.

INSTALLATION AND IMPLEMENTATION

There were many difficulties to overcome from the beginning of the beta test project, some as a result of inadequate file and site preparation, and some that were vendor related. A copy of the NOTIS Library Management System software was installed on an existing computer on campus for staff to use to become familiar with the system. Only three terminals were available, training was minimal, and documentation inadequate. This resulted in frustration and negative attitudes on the part of staff which took several months to overcome. These or similar conditions are likely to be typical of beta test situations and should be carefully explained to library staff at the beginning of the project.

After the KeyNOTIS software was installed on the new equipment in May 1990, the actual beta testing began. The time allotted to the beta testing period, as specified in the contract, was shorter than most of us were comfortable with. After NOTIS was satisfied with its beta test, we proceeded with our own acceptance testing, which became impossible as we attempted to test modules for which we had had no training. Some staff members confused the process of going through the beta test scripts with NOTIS staff with training sessions and felt it was poorly done. Many of the problems, and the resulting staff negativity, we encountered at the beginning of the project could have been avoided if the beta testing process had been better understood by library staff.

The decision in favor of accepting the software was not unanimous, but the system was accepted because it had passed the beta test and was functioning well, and because the vendor is a well-established company with a good track record. We were receiving prompt and helpful responses to our reports of program errors or other problems, and had confidence in the vendor's willingness to continue to respond in this manner. This they have done. We also had to consider the time and money we had already devoted to the project.

Since completion of the beta test phase, we continue to find an occasional program error (or "bug") and to have problems related to training or documentation. These bugs are generally resolved in a reasonable amount of time, either by a NOTIS engineer dialing into the system or via update tapes sent to us by NOTIS. Documentation has been improved and supplemented by in-house training aids. The learning process has progressed and staff attitudes and performance have improved.

KeyNOTIS was installed in May 1990, and by the end of August cataloging was in operation and we were ready to bring up the OPAC for public use. Shortly thereafter, we stopped receiving full sets of catalog cards from OCLC, although we have chosen to maintain the shelflist for now. The circulation subsystem has been in use since May 1991. Acquisitions and serials will be brought online in 1992.

RELATIONSHIP WITH VENDOR

One of the responsibilities of CSUSB as a beta test site was to identify problems and pro-

gramming errors in the system. The staff at NOTIS have been very helpful in resolving problems. Some were solved with explanations and assistance over the phone. Others required the attention of a systems engineer. In this very important area, our relationship with NOTIS has been excellent. With regular telephone and telefax contact, sometimes several times a day, prompt attention was given to most problems reported. A beta test will not be successful without a good working relationship between the site and the vendor.

NOTIS encouraged us to make suggestions for improvements to the system and the documentation. Many minor changes have been made, but in most cases we have been told to contact the NOTIS special interest groups and ask that the suggestion be placed on the annual enhancement ballot for all sites to vote on. This is another area of misunderstanding between CSUSB staff and NOTIS. Many of our staff thought that NOTIS would incorporate the changes we requested as part of the beta testing arrangement. The KeyNOTIS software was in final development at the beginning of the beta test. NOTIS cannot customize each KeyNOTIS system for each installation, including the beta test site. This is most likely true with any beta tested software.

RECOMMENDATIONS

In reviewing our experience as a beta test site and as the first installation site of a new system, I can make several suggestions to other libraries contemplating a major automation project, whether or not as a test site. It would be unrealistic to expect to meet many of these recommendations in a beta testing situation, but experience has certainly demonstrated their importance.

Ideally, someone with experience, either with the system being purchased or with implementation of integrated library systems, should be hired and an implementation committee formed, consisting of people who will be working with the system on a daily basis and who have little or no "technophobia." This committee may well be a mixture of professional and paraprofessional staff. Rank and status have little bearing on the abilities and knowledge needed. Staff need to be assigned to oversee both the technical-operational and the administrative aspects of the project.

Libraries are made up of distinct, but interrelated, departments. The purpose of an integrated library system is to meet the functional needs of all of these departments, coordinate their activities, provide management information, and serve as a catalog for staff and public use. An implementation committee based on the concept of matrix management, which brings together specialists from different functional areas to work on a specific project, would be ideal. A variety of skills and points of view focused on the project enables the committee to balance the requirements of various library functions and departmental needs in their decision-making process, and later, during the implementation and training phases of the project.[4,5] During a beta test, the matrix management model becomes even more useful, as library staff may need to interact with the vendor's systems engineers and programmers, in addition to the marketing and customer service staffs to whom we are accustomed.

A significant amount of preparation must be done when a major automation project is anticipated. Conversion of bibliographic records into MARC format, removal of duplicate records, and authority work can all be done ahead of time. Site preparation may have to wait until a system is selected due to the detailed technical specifications that must be satisfied. Financial planning and research into the cost of implementing an integrated system will enable a library to set aside funds so that once a system is selected, final preparation and implementation can be done quickly and with few delays.

It is recommended that complete documentation be made available before installation and training. Clarify with the vendor what should be included in complete documentation. If entering a test situation, find out if the documentation has been finished and, if not, what is missing and when it will be provided.

Training procedures and expectations need to be spelled out clearly in advance, both to administrators and to staff members being trained. The library should know what the trainer requires and should be able to provide adequate equipment and facilities. The library needs guidance from the vendor on who should attend the vendor's training sessions and how to transfer the skills and information to the rest of the library staff. If all of this is clearly understood, the best decisions can be made concerning the amount of training

needed and who should attend that training. More training than is normally provided by the vendor might be desired and worth the extra expense.

Establishing a good relationship with the vendor's training and customer services staff is invaluable. Once the contract is signed, the automation project can be seen as a cooperative effort, with both the library and the vendor eager for a successful implementation. With this common goal in mind, the vendor and the library can develop a sense of partnership, without forgetting their contractual and financial relationship. The library staff, usually via a designated contact person, needs to feel welcome to call for help or to ask questions and make suggestions.

In retrospect, once we were beyond the beta testing and acceptance testing that took place during the first four months, automating as a beta test site did not cause much more disruption of routine, or extra work, than the installation of an established system would have. Our major problems were created by a hurried implementation begun before proper site and file preparation had been completed and before adequate documentation was provided by the vendor. These problems should be avoidable in a well-planned automation project.

As file and site preparation, and vendor documentation are completed and improved, the system's attributes become more apparent, as do its shortcomings. Library staff attitudes toward the system continue to improve and patrons continue to be enthusiastic users. If a library has the luxury of following the above suggestions, acquiring an integrated automation system can be an exciting and rewarding experience.

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APPENDIX A. PROS AND CONS OF BETA TESTING

Advantages for the test site library:
- Access to new software or technology
- Opportunity to be in the forefront
- Beta test experience itself
- Free or discounted hardware or software
- Possible extra support from the vendor
- Possible influence on the future development of the product

Disadvantages or risks for the test site library:
- Extra time and effort required by the beta test
- Time spent identifying and resolving software errors
- Possible pressure from the vendor to meet short deadlines
- Staff negativity
- Risk of investing time and money in an unacceptable product
- Use by vendor as an advertising or promotional vehicle

Advantages for the vendor:
- Opportunity to find and correct software errors
- Opportunity to receive customer feedback on the software
- Early planning for enhancements for the next release
- Feedback on the documentation and training
- Prerelease advertising and a demonstration site

Disadvantages or risks for the vendor:
- Unsuitable test site selected
- Risk to reputation and future sales if beta test fails

SETTING STANDARDS IS EVERYONE'S BUSINESS.

Establishing effective technical standards. It makes good business sense, no matter what business you're in. Because clear, cohesive practices and procedures help things run smoothly.

Which is why we need your help.

Who are we? We're NISO. The National Information Standards Organization. We develop technical standards for the entire range of information services and products: online information services, librarianship, bookselling, indexing, and library equipment and supplies. In fact, our standards are an integral part of many work environments.

NISO has developed over fifty information standards. Here are just a few of the standards that benefit you.

- Standard identifiers for books and serials
- Standard format and vocabulary for information sharing
- Standard computer-to-computer protocol linking local, regional, national, and international bibliographic systems
- Standards for permanent and durable book papers and bindings

How can you help us? By helping NISO set the standards in your profession. Because only with the input of successful organizations like yours can we develop proper standards. We also need your help with funding. You see, we depend on the support of our members. Members from all types of organizations including libraries, publishers, large and small companies, and government agencies. There are a range of membership options available; one is right for your organization.

What's in it for you? A chance to influence your profession's direction and growth by setting its standards. A chance to work closely with your peers. A chance to plan for the new standards that will directly affect you.

What should you do now? Call, write, or fax us. We'll tell you more about ourselves, how we can work for you, and how you can help us.

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Special Section: The USMARC Community Information Format

These papers are based on presentations made at a program titled "Using the Community Information Format to Access Nonbibliographic Data." The program was sponsored jointly by the LITA Online Catalogs Interest Group and the PLA Community Information Section Technologies Committee at the ALA Annual Conference in San Francisco on June 28, 1992.—*Marilyn R. Lutz, Section Editor.*

Using the Community Information Format to Create a Public Service Resource Network

Marilyn Lutz, Sharon Quinn Fitzgerald, and Thomas Zantow

Institutions of higher education are experiencing increased demands to extend their resources beyond the traditional campus to meet the social, economic, and technological needs of society. A persistent problem in developing a workable interface between university resources and community needs, until recently, has been the issue of access, and the barriers that flow from isolation and unfamiliarity. Electronic information technologies are breaking down these barriers and have emerged as the mechanism for networking academic expertise within the university itself and linking that expertise with society at large. Electronic networks are being designed to expand the role of the university in addressing the needs of individuals, governments, businesses, and nonprofit organizations through greater accessibility to diverse resources. An information and retrieval database (I & R) is pivotal to the design of a public service resource network and a key component in making nonbibliographic information accessible via the network.

The University of Maine System (UMS) is no exception in this effort to improve the linkage of systemwide resources with statewide needs. The university system is a seven-campus, public university system that provides a full range of higher education services to the citizens of Maine. The university employs over 1,400 faculty and nearly 1,200 professional and administrative personnel, and offers 260 undergraduate programs and more than 70 graduate programs to over 31,000 students. The university system was established to teach, conduct research, and provide public service. In the last category, each campus has both regional and statewide responsibilities. The University of Maine, the flagship campus located in Orono (twelve miles north of Bangor), given its land grant and sea grant responsibilities and the scope of its graduate programs, has the most substantial statewide programs. Each of the other campuses, though responsible for university services used by residents from all sections of the state, offers unique programs targeted primarily to the geographic area in which it is located.

The flagship campus in Orono is also headquarters for URSUS, a Digital-based automated library system running Innovative Interfaces, Inc., Innopac software. The library system is accessible on a statewide telecommunications network that links over T1 facilities the seven campus libraries, the Maine state libraries, and the Bangor Public Library (all of which contribute holdings to the union

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catalog), and over eighty-three outreach sites of the Community College of Maine. The network is connected to the Internet.

These characteristics represent a significant pool of resources to the people and economy of Maine. All campuses of the system share public service responsibilities for linking resources to community, regional, and state needs; however, there is no formal, statewide planning, coordination, or marketing of campus-based public service activities. As a result, important public service programs may not be accessible to all areas of the state, and the smaller campuses may require assistance in the development and implementation of public service activities.

The University of Maine System defines *public service* to mean "organized non-credit programs and courses, services, and activities which link and extend university and community resources for the intellectual and educational benefit of individual, government, business and other organizations. Public service activities may be offered on a fee, non-fee, or contribution basis."

DESIGN OF PUBLIC SERVICE RESOURCE NETWORK

The UMS public service resource network consists of an electronic database with designated individuals throughout the university system responsible for the operation of the resource network. An advisory board representing each of the campuses provides oversight of the network's operations and future expansion. The online catalog contains the profiles of participating faculty relative to their professional expertise, willingness to engage in various public service activities, and previous consulting experience, as well as records of organizational units, services, programs and facilities. Through the use of the online catalog and a toll-free telephone number, users are able to contact a local coordinator on any of the university campuses who can assist in clearly defining the problem at hand and discuss appropriate types of resources. The local coordinators use the online catalog to identify individuals or organizations that possess the needed expertise, are available, and are willing to discuss the identified problem with the client. This information is then provided to the client with the option of directly contacting the identified resource person.

LIBRARY LINKS PUBLIC SERVICE NETWORK WITH DATABASE

In the fall of 1990 the Raymond H. Fogler Library at the University of Maine was approached with a proposal to implement a pilot project for the UMS Public Service Council. URSUS, the library's electronic information system, was selected as the most desirable and appropriate location for an online database of public resources. The administrators wanted a database that would retain the easy accessibility of the library's online catalog while serving as the central focus of a public service network. Like the library's online catalog, the public resource database would link the university system in a way that would be responsive, expandable, and highly visible and easily accessible to the public without detracting from the individual public service initiatives of the separate campuses. The then-evolving USMARC Community Information Format (CIF) would be used to create a database of nonbibliographic information, composed of records of individuals, programs and services, facilities, and events.

RATIONALE

The library was consulted regarding creation of the online catalog, appropriate software and hardware, public access to the resource catalog, staff to implement a pilot project, and ongoing maintenance of the online catalog.

Some of the objectives of the pilot project were:

1. to demonstrate a coordinated approach for systemwide public service and enhance connections among the separate campuses;
2. to encourage communication among faculty in diverse fields;
3. to create a public relations tool for the library and the university;
4. to increase the academic community's awareness of the potential of a library information system and the public's awareness of the capabilities of the university system;
5. to demonstrate the potential for expanding system liaisons with business and industry and assist in identifying system strengths and weaknesses as it relates to constituency needs; and
6. to provide a test bed for the implementation of the community information format.

PROJECT MANAGEMENT

The database project team consisted of the systems librarian, two catalogers, and a representative from the UMS Public Service Council. Charged with the responsibility for creating a demonstration database of several hundred records, the project team profiled the software and established cataloging policies and procedures that would serve staff outside the library. It immediately became apparent after reviewing sample data that nonbibliographic records would require display labels and index names that would conflict with those profiled in the library's online catalog of bibliographic resources. The library software did not include the ability to manipulate record display labels for multiple formats in a single file. While access points for nonbibliographic data were similar to those on the bibliographic records, index names, type of data tagged, and preferred order of information necessitated separate files. For example, the organizational unit responsible for a program, service, or event is defined in field 110, labeled "Sponsor," and displays after field 245, which contains the name of the program or service. In the bibliographic file, corporate authors (110) are labeled "Author" and display before the title (245).

These considerations precluded integrating nonbibliographic records in the library's bibliographic database. The decision was made to create an alternative database on the library system, using the same online catalog and database maintenance software, and provide access to it from the library's public menu.

DATABASE CONSIDERATIONS

The initial database of two hundred records was built using information collected with two surveys. For faculty and administrative staff, inclusion in the online catalog was voluntary. Data were gathered from a questionnaire concerning their areas of expertise, consulting experience, and preferred types of clients. Similar surveys were conducted to collect information on the various centers, institutes, and bureaus that exist throughout the university system. Since separately indexed files for each record type (i.e., faculty, program, facility) could not be created with the existing software, the challenge was to design display labels, MARC field equivalents, definitions, and indexing that could be mapped across three record types. The tag map shows the chart that was developed and served as a guide throughout the project (see appendix A).

CODING DATA ELEMENTS: ADOPTING THE CIF DRAFT PROPOSAL

Concurrent with the project team's concern about how to code the data elements were the efforts of the Technologies Committee of the Community Information Section of the Public Library Association. A draft document titled "Community Information Records in USMARC" was obtained from the Network Development and MARC Standards Office. (The document has since evolved into the "USMARC Community Information Format," which was given provisional approval in January 1992.) The format provided for input of nonbibliographic data pertaining to programs, services, events, organizations, agencies, and individuals into machine-readable form. The project team decided to use the draft format document, adapting it to software and database requirements.

Initial discussions centered on determining the composition of the database, data elements in each record type, and access points for all data. Definitions of the kind of data to describe three types of nonbibliographic information evolved out of the first questionnaires and included the following:

p—program/service: data about the activity offered by a group

n—individual: biographic data about an individual with particular expertise (faculty, administrative, and professional personnel)

f—facility: data about a facility, e.g., planetarium, library

Subsequently a fourth code was defined for events (q—event: data that pertain to a happening) but has not yet been used in the database. In most instances, programs and services were tied to sponsoring organizations. For this reason it was decided not to create a separate record type for organizations as prescribed by the CIF. The sponsoring resource unit associated with the program, service, event, or facility administration would be defined in field 110 and the name of the program or service in field 245. This decision reduced the amount of redundant data entry, given the specific nature of the pilot database.

```
 B1001346          Last updated: 09-03-91  Created: 07-24-91  Revision: 2
01 LANG: eng    03 LOCATION: o       05 BCODE1: p         07 BCODE3: -
02 SKIP: 0      04 CAT DA 07-18-91   06 BCODE2: -         08 COUNTRY: meu
09 035      Orono
10 040      MEU|cMEU
11 092      PROGRAM #Op1001346
12 110   2  University of Maine
13 245    0 National Center for Geographic Information and Analysis
14 246      NCGIA
15 270   0  Boardman Hall, University of Maine,|bOrono,|cME|e04469. |fTel: (207
            ) 581-2149 |gFAX: (207) 581-2206 |hBITNET: NCGIA*MAINE
16 301      8:00 - 4:30, Mon. - Fri.
17 500      The research program is structured as a series of initiatives, each
            one focusing on a single topic for a period of one to two years.
            Five areas of concentration have been identified including: 1)
            Spatial analysis and statistics; -- 2) Spatial relationships and
            database structures; -- 3) Artificial intelligence and expert
            systems; -- 4) Visualization; -- 5) Social, economic and
            institutional issues.
18 500      The Center also focuses on education and has developed a model one
            -year curriculum designed to increase the availability of teaching
            materials in GIS.
19 505      In addition to research, the Center is to take steps to augment the
            nation's supply of experts in Geographic Information Systems (GIS)
            and geographic analysis in participating disciplines; promote the
            diffusion of analysis based on GIS throughout the scientific
            community; and provide a clearinghouse for disseminating
            information regarding research, teaching and applications.
20 520      To provide a national focal point for addressing the issues that
            impede the progress of research, education and knowledge
            dissemination in geographic information analysis.
21 521      Researchers, and GIS specialists.
22 536      The NCGIA is funded by the National Science Foundation.
23 550   0  Andrew Frank
24 570      Kathleen Hornsby
25 575      The Center is a consortium of the Univ. of California at Santa
            Barbara, the State University of New York at Buffalo, and the
            University of Maine.
26 581      "NCGIA Update Newsletter"
27 581      "Language of Spatial Relations: Researchable Questions and the
            NCGIA Research Agenda"
28 581      "Use and Value of Geographic Information: Specialist Meeting
            Summary Report and Proceedings"
29 581      "Two Perspectives on Geographic Data Modelling"
30 650    0 Geography|xResearch.
31 650    0 Geography|xStudy and teaching.
32 700   1  Frank, Andrew
```

Figure 1. MARC Display—Program Record.

Throughout the evolution of the project, application of the format in the local context took priority over rigorous adherence to several drafts and the final proposed format. For example, leader elements were not defined beyond the needs of the software (date, kind of data codes); 0XX fields were not defined except for a specialized record identification number; and the extensive 5XX fields were redefined to fit local categories (e.g., the 500 field is used for "Activities" instead of a generic note).

Difficulties in reconciling the difference between the survey categories and MARC tag definitions frequently led to reevaluating field definitions and display labels. Each record type dictated unique data elements, as illustrated in appendix A. In the beginning the structure favored the program record, served faculty records adequately, and failed with facility records. Most of the 5XX display labels reflected field definitions for programs, making use of 5XX fields for faculty records awkward (e.g., "Services" label on a faculty member's expertise). Facility records used 5XX fields very infrequently, relying on a single field (311). In the latter instance, the absurdity of the end user wading through one massive block of copy was remedied by using repeated fields, which created logical breaks for a more readable public display. See figures 1–6 illustrating public and MARC displays of program, individual, and facility records.

INDEXING ISSUES

The end user's perspective guided the sequence in which information would be displayed, the choice of field labels, and how the

RECORD ID	PROGRAM #Op1001346.
PROGRAM	National Center for Geographic Information and Analysis. NCGIA
SPONSOR	University of Maine
ADDRESS	Boardman Hall, University of Maine, Orono, ME 04469. Tel: (207) 581-2149 FAX: (207) 581-2206 BITNET: NCGIA*MAINE
TIME+PLACE	8:00 - 4:30, Mon. - Fri.
DIRECTOR	Andrew Frank
CONTACT	Kathleen Hornsby
PURPOSE	To provide a national focal point for addressing the issues that impede the progress of research, education and knowledge dissemination in geographic information analysis.
SERVICES	In addition to research, the Center is to take steps to augment the nation's supply of experts in Geographic Information Systems (GIS) and geographic analysis in participating disciplines; promote the diffusion of analysis based on GIS throughout the scientific community; and provide a clearinghouse for disseminating information regarding research, teaching and applications.
ACTIVITIES	The research program is structured as a series of initiatives, each one focusing on a single topic for a period of one to two years. Five areas of concentration have been identified including: 1) Spatial analysis and statistics; -- 2) Spatial relationships and database structures; -- 3) Artificial intelligence and expert systems; -- 4) Visualization; -- 5) Social, economic and institutional issues. The Center also focuses on education and has developed a model one-year curriculum designed to increase the availability of teaching materials in GIS.
AUDIENCE	Researchers, and GIS specialists.
FUNDING	The NCGIA is funded by the National Science Foundation.
AFFILIATION	The Center is a consortium of the Univ. of California at Santa Barbara, the State University of New York at Buffalo, and the University of Maine.
PUBLICAT'NS	"NCGIA Update Newsletter" "Language of Spatial Relations: Researchable Questions and the NCGIA Research Agenda" "Use and Value of Geographic Information: Specialist Meeting Summary Report and Proceedings" "Two Perspectives on Geographic Data Modelling"
SUBJECT	Geography|xResearch. Geography|xStudy and teaching.
ALT ENTRY	Frank, Andrew.

Figure 2. Public Display—Program Record.

data would be accessed. Indexes were created for personal name, organization, subject, publication, location, record number, and identification number. Keyword access to all fields was essential, given the extensive notes. Even with total keyword capabilities, subject access with controlled vocabulary was retained to complement the unstructured form of keywords. The Library of Congress Subject Headings were chosen as they offered the "least worst" vocabulary; the available headings often seemed confusing from the patron's perspective but were familiar from other library experiences and were comprehensive.

Very early on, a sample database of a few records was keyed into the system, and from this experience the obvious need to document entry conventions for all staff became clear. Thus, a local format handbook was devised.

LOCAL DECISIONS ON FORMAT

Throughout the project adopting the proposed national standard was emphasized whenever conflict with local interpretation or need arose. However, a number of significant points of departure evolved. Due to its history, the Community Information Format focused primarily on program-type records (organization, program or service, event). The pilot project database required an expanded interpretation of MARC structure and field definition, particularly for development of facility-type records. Thus, in the leader field, four major types of record codes were used: individual, program or service, facility, and event. The CIF did not specify a code for facility data but subsequently provided a category "z" defined as "other."

Specialized note fields were introduced in the second draft of the CIF and retained in

```
B1000347          Last updated: 02-25-92  Created: 02-25-92  Revision: 10
01 LANG: eng   03 LOCATION: o      05 BCODE1: b       07 BCODE3: -
02 SKIP: 0     04 CAT DA 02-25-92  06 BCODE2: -       08 COUNTRY: meu
09 035      Orono
10 040      MEU|cMEU
11 092      PERSONNEL #Ob1000347
12 100  1   Casserly, Mary F. --|cCollection Development Division Head
13 110  2   University of Maine
14 270  1   Administrative Offices 1B, Fogler Library, University of Maine,
            |bOrono,|cME|e04469.|fTel: (207) 581-1659.|gFAX: (207) 581-1653.
            |hBITNET: CASSERLY@MAINE.
15 301      8:00 - 5:00 Mon. - Fri.
16 500      INSTRUCTIONAL: Willing to offer non-credit small workshops at off
            -campus locations and during alternative schedules (e.g., evenings,
            weekends, summer).
17 500      RESEARCH: Interested in collaborative research with investigators
            at other Maine campuses and from other institutions, and proposal
            and/or peer reviews.
18 500      PUBLIC SERVICE: Willing to engage in conference development
            /participation. Willing to serve as consultant in designing
            studies of library service and performance.
19 505      Areas of expertise include: collection development, selection of
            material, library planning and self study, library's role in
            regional accreditation of institution.
20 521      Librarians
21 570      Jane Brown (Tel.: 581-1661)
22 576      BA--International Affairs, George Washington University, 1972. MS-
            -Library Science, Drexel University, 1973. Ph.D--Library and
            Information Studies, Rutgers University, 1984.
23 576      TEACHING: taught 2 semesters of undergraduate level coursework in
            reference and collection development.
24 576      RESEARCH: 1) Self-study and planned change in academic libraries; 2
            ) Material availability: a study of academic library performance; 3
            ) Study of evaluation of collection development personnel
25 576      CONSULTING: Consulted as follow-up to a materials availability
            study for William Paterson College Library. Review of numerous
            research projects: i.e., research designs for studies in the area
            of library service.
26 581      |tCollection Development in College and University Libraries: a
            Comparison,|qin Hill, Joanne ed., Collection Development in College
            Libraries, 1991.
27 581      |tMaterials Availability: a Study of Academic Library Performance,
            |qwith Ciliberti, Mitchell and Hogg, in College and Research
            Libraries 48:4 (Nov. 1987) p. 513-527.
28 581      |tAccreditation: Related Self-Study as a Planned Change Process:
            Factors Related to its Success in Academic Libraries,|qin Journal
            of Library Administration 8:1 (Spring, 1987) p. 85-105.
29 581      |tAcademic Library Regional Accreditation,|qin College and Research
            Libraries 47:1 (January, 1986) p. 38-47.
30 650   0  Collection development (Libraries)
31 650   0  Library science
32 650   0  Library planning
33 650   0  Accreditation (Education)
```

Figure 3. MARC Display—Individual Record.

the final proposal. The majority of these note fields addressed information specific to programs (e.g., 571 Volunteer Opportunities Note, 574 Travel and Direction Note, 576 Generic Programs and Services Note). For the project database, this level of specificity was unnecessary, and these fields currently are not used. However, one field was added, 590 (Local General Note), to address situations where textual information would best serve the user. Also, field 575 (Structural and Other Accommodations for the Disabled), is not employed, as information is adequately noted in field 311, subfield h, as defined in the second CIF draft.

One of the most significant departures is the use of field 035 (System Control Number) for location. Initially the field was defined and labeled as campus location, but it has become more generic as the possibilities for the scope of the database broadened. The tagging and indexing have been retained in order to facilitate a first-level search by location. Geographic accessibility will be critical to patrons searching the database for resources in their vicinity. As the database grows, more geographic specificity will be necessary, and for this reason expansion of field 052 (Geographic Classification Code) is advocated to include a subfield c to incorporate a subarea

```
RECORD ID       PERSONNEL #Ob1000347
SPONSOR         University of Maine
TIME+PLACE      8:00 - 5:00 Mon. - Fri.
CONTACT         Jane Brown (Tel.: 581-1661)
SERVICES        Areas of expertise include: collection development, selection of
                  material, library planning and self study, library's role in
                  regional accreditation of institution.
ACTIVITIES      INSTRUCTIONAL: Willing to offer non-credit small workshops at off
                  -campus locations and during alternative schedules (e.g.,
                  evenings, weekends, summer).
                RESEARCH: Interested in collaborative research with investigators
                  at other Maine campuses and from other institutions, and
                  proposal and/or peer reviews.
                PUBLIC SERVICE: Willing to engage in conference development
                  /participation. Willing to serve as consultant in designing
                  studies of library service and performance.
AUDIENCE        Librarians.
CREDENTIALS:    BA--International Affairs, George Washington University, 1972. MS
                  --Library Science, Drexel University, 1973. Ph.D--Library and
                  Information Studies, Rutgers University, 1984.
                TEACHING: taught 2 semesters of undergraduate level coursework in
                  reference and collection development.
                RESEARCH: 1) Self-study and planned change in academic libraries;
                  2) Material availability: a study of academic library
                  performance; 3) Study of evaluation of collection development
                  personnel
                CONSULTING: Consulted as follow-up to a materials availability
                  study for William Paterson College Library. Review of numerous
                  research projects: i.e., research designs for studies in the
                  area of library service.
PUBLICAT'NS     Collection Development in College and University Libraries: a
                  Comparison, in Hill, Joanne ed., Collection Development in
                  College Libraries, 1991.
                Materials Availability: a Study of Academic Library Performance,
                  with Ciliberti, Mitchell and Hogg, in College and Research
                  Libraries 48:4 (Nov. 1987) p. 513-527.
                Accreditation: Related Self-Study as a Planned Change Process:
                  Factors Related to its Success in Academic Libraries, in
                  Journal of Library Administration 8:1 (Spring, 1987) p. 85-105.
                Academic Library Regional Accreditation, in College and Research
                  Libraries 47:1 (January, 1986) p. 38-47.
SUBJECT         Collection development (Libraries)
                Library science
                Library planning
                Accreditation (Education)
```

Figure 4. Public Display—Individual Record.

on a town or county level. This expansion would be preferable to using field 059 (Local Geographic Classification), since a hierarchical single field could be utilized for truncated searching similar to "browsing" an LC call number index. For example, a search of BF721 for available services on child psychology could be limited to Maine, Penobscot County, town of Orono, with the coding taking the form of: 052 $a State (from LC "G" classification), $b County (from LC "G" classification), $c Community (from local list).

Concern over suppression of confidential information on individual records resulted in another point of departure from the CIF format. The need to suppress from public display fields containing confidential data on faculty records was met by assigning values to field indicators. For fields 270 (Primary Address) and 570 (Personnel Note), the first indicator in both cases was defined to suppress the display on public screens. Indicators had been consistently discarded from the application, reflecting the lack of card production and other capabilities the system would not support. The use of indicators to suppress the display of data had not been used previously in the library system and proved to be an essential feature of the software for the project database.

Lastly, a major departure from CIF was the unique treatment of publication titles in the project database. Rather than creating both a field 581 (Publications Note) and a related field 740 (Added Entry—Specific Program Title), a separate publications title index is mapped directly from field 581, subfield t. (Subfield q is provided for nonindexed

```
B1000159          Last updated: 08-29-91  Created: 04-30-91  Revision: 10
01 LANG: eng   03 LOCATION: o      05 BCODE1: f       07 BCODE3: -
02 SKIP: 0     04 CAT DA 04-25-91  06 BCODE2: -       08 COUNTRY: meu
09 035      Orono
10 040      MEU|cMEU
11 092      FACILITY #0f1000159
12 110   2  University of Maine
13 245    0 University of Maine Planetarium
14 246      Planetarium
15 270   0  Wingate Hall, University of Maine,|bOrono,|cME,|e04669.|fTel.: (207)
            581-1341
16 311      The Planetarium produces and presents 3 or more feature planetarium
            shows per year.  Shows or lessons are presented to public schools
            which support a curriculum-based earth science astronomy unit.
            Presentations are available for all levels and groups can arrange
            visits to suit their schedules throughout the year.
17 520      To conduct educational activities for students in astronomy courses
            and conduct outreach to public and private sectors.
18 521      Pre-K to adult public, school, University and social organizations.
19 522      Eastern and central Maine
20 531      |b$2.00 under 18, $3.00 adult and .50 per person discount for
            public school groups.
21 536      The Planetarium is supported through a combination of admissions
            fees, the University of Maine, and UM student fees.
22 550      Alan Davenport
23 575      The Planetarium is operated by the UM College of Sciences.  The
            Planetarium and the director are members of the Middle Atlantic
            Planetarium Society, The Great Lakes Planetarium Association, and
            the planetarium is an institutional member of the International
            Planetarium Society.
24 650    0 Planetaria
25 700    1 Davenport, Alan
```

Figure 5. MARC Display—Facility Record.

```
RECORD ID     FACILITY #0f1000159.
PROGRAM       University of Maine Planetarium.
              Planetarium.
SPONSOR       University of Maine.
ADDRESS       Wingate Hall, University of Maine, Orono, ME, 04669. Tel.: (207)
                581-1341.
FACILITIES    The Planetarium produces and presents 3 or more feature
                planetarium shows per year.  Shows or lessons are presented to
                public schools which support a curriculum-based earth science
                astronomy unit. Presentations are available for all levels and
                groups can arrange visits to suit their schedules throughout
                the year.
DIRECTOR      Alan Davenport.
PURPOSE       To conduct educational activities for students in astronomy
                courses and conduct outreach to public and private sectors.
AREA SERVED   Eastern and central Maine.
AUDIENCE      Pre-K to adult public, school, University and social
                organizations.
FUNDING       The Planetarium is supported through a combination of admissions
                fees, the University of Maine, and UM student fees.
FEES          $2.00 under 18, $3.00 adult and .50 per person discount for
                public school groups.
AFFILIATION   The Planetarium is operated by the UM College of Sciences.  The
                Planetarium and the director are members of the Middle Atlantic
                Planetarium Society, The Great Lakes Planetarium Association,
                and the planetarium is an institutional member of the
                International Planetarium Society.
SUBJECT       Planetaria.
ALT ENTRY     Davenport, Alan.
```

Figure 6. Public Display Record—Facility Record.

prose descriptions.) Fields 630 and 730 subfield t (Added Entry—Publications Title) remain mapped to the organization/title index in accordance with the CIF.

There are a number of fields in CIF with no current application in the pilot project database. An example would be field 440 (Series Title). To accommodate future implementation, the database has been profiled to support this and other currently undefined fields. On the other hand, the scope of some existing fields has been broadened, largely to accommodate facility and other types of records. For example, field 505 (Specific Programs Note) is a "Services" note in our application so that specific offerings of both programs and individuals can be listed and accessed with keyword indexing.

CONCLUSION

The most significant problems that arose out of efforts to balance database requirements, software, and the evolving format standard have been resolved, and the file has been re-indexed to conform to final profile changes. The overall dynamics of decision making, which began with application requirements and were subsequently dominated by the application software, are currently driven by the desire to be consistent with the national standard.

The UMSserve information and retrieval database is pivotal to the design of a public service resource network and a key component in making nonbibliographic information accessible via the network. In April 1991 the UMSserve database was made available for public searching. The database includes representation from all seven campuses across all three record types: personnel, programs, and facilities. Coverage of programs and facilities is the most complete systemwide. At present the database has 600 profiles (430 biographies, 125 program descriptions, and 45 facility descriptions). Users have access to descriptions of public service programs and facilities, and are referred to a campus coordinator for assistance in locating a person with specific expertise.

The development of the Community Information Format has been critical to the design of the UMSserve database, in that the standard addressed data elements to be contained in online nonbibliographic information and allowed for descriptions of organizations, programs, services, and individuals. CIF also met the UMSserve database requirements because it maintained relevant connections to current MARC bibliographic standards while allowing greater flexibility and latitude to fit multiple, widely varying needs with new features. The successful implementation of UMSserve has enhanced administrative and public access to local resources and expertise. ■■

APPENDIX A. UMSSERVE COMMUNITY INFORMATION RECORDS IN USMARC

FIELD	LABEL	RECORD TYPE I CONTENTS - FACULTY	RECORD TYPE II CONTENTS - ORG. UNITS	RECORD TYPE III CONTENTS - FACILITIES
092	RECORD ID	Faculty/Staff **UMSserve** ID#	Program ID#	Facility ID#
100	NAME	Name of faculty member, academic and/or administrative rank		
245-246	PROGRAM		Name of Specific Public Service Program described in this record	Name of facility, meeting room, or equipment
110	SPONSOR	Name of Sponsoring Institution =b Subordinate Unit	Name of Sponsoring Institution =b Subordinate Unit	Name of Sponsoring Institution =b Subordinate Unit
035	LOCATION	Location of faculty member	Location of program	Name of facility
270-276	ADDRESS	Office address Telephone # FAX # Electronic Mail	Office address Telephone # FAX # Electronic Mail	Office address Telephone # FAX # Electronic Mail
301-303	TIME+PLACE	Usual office hours	Usual open hours Regular public meetings Staff size	Usual availability
311	FACILITIES			Facilities available Name of room Facilities description Equipment available Rental fees
550	DIRECTOR		Name of unit or program director	Name of facility director
570	CONTACT	Name of **UMSserve** coordinator Name of campus liaison	Name of unit or program contact person	Name of person to contact to reserve facilities and equipment
520	PURPOSE		General goals and objectives	

FIELD	LABEL	RECORD TYPE I CONTENTS - FACULTY	RECORD TYPE II CONTENTS - ORG. UNITS	RECORD TYPE III CONTENTS - FACILITIES
522	AREA SERVED	Geographic limits of public service activities	Geographic area served	
505	SERVICES	Specific areas of knowledge or specialization related to professional or personal interests	Names of specific individual programs	
500	ACTIVITIES	Availability for specific types of educational, research/consulting, and other public service activities	Specific program information and program or unit functions	Activities sponsored
521	AUDIENCE	Typical clientele	Typical clientele or target audience	Typical clientele
576	CREDENTIALS	Overview of academic and professional experience	Accreditation or certifications	Certifications
536	FUNDING	History of external funding	Funding sources for programs	Funding sources for specific equipment
531	FEES		Program fees; eligibility requirements; procedures for obtaining services; waiting period	Fees schedule; eligibility requirements; procedures for reserving facilities; general availability
546	LANGUAGE	Fluency in foreign languages	Services or staff capabilities in foreign languages	Staff ability to speak foreign languages
575	AFFILIATIONS	Complex relationships	Former names; complex relationships	Former facility and equipment names; complex relationships
581	PUBLICATIONS	Bibliography of selected publications	Unit or program publications	Publications
587	PUBLICATIONS	Misc. publication information	Misc. publication information	Misc. publication information
590	NOTE	Misc. information	Misc. information	Misc. information
600-69X	SUBJECT	Subject keywords	Subject keywords	Subject keywords
700-74X	ALT ENTRY			

NOTE: Fields which are underscored will be suppressed from display in the public catalog.

Diversity Information Online: The Development of a CIF-Based Database

Pat Ensor

Indiana State University (ISU) has been developing a local database since the end of 1990, although the active phase of development began at the end of 1991. This database is DION (Diversity Information ONline) and is based on the draft Community Information Format (CIF). DION resides on ISU Libraries' LUIS II library information system. This system includes a NOTIS OPAC and two other bibliographic databases that are searched using NOTIS' Multiple Database Access System (MDAS) in addition to DION.

The DION database currently contains 165 records that cover a variety of materials relating to multicultural, multiethnic, and differently abled populations. It provides pointers to organizations, individuals, events, courses, scholarships, programs, displays, and other relevant information, and includes the full text of some documents. The database will be released to the public in the fall of 1992. Access will be available in the library through dial-up lines via the State University Libraries of Indiana Automation Network (SULAN) and over the Internet. It has been successfully demonstrated at IBM's INFORMA 1992 conference on campuswide information systems.

HISTORICAL DEVELOPMENT

Indiana State University has about 11,500 students (2,000 of them graduate students) and 550 faculty members. It began as a teachers' college and maintains an emphasis on teacher education but also has schools of nursing, technology, business, and a college of arts and sciences—in other words, an average, medium-sized state university. As such, the university has developed an intense and long-overdue interest in increasing and supporting diversity on campus. Racial incidents have brought this issue to the forefront of public concerns, not an uncommon situation at today's universities. Administrative response has included policy statements, the creation of mentoring programs, the expansion of scholarships, and student and staff recruitment programs. However, it is not the business of any one office to keep track of such efforts or serve as a clearinghouse for information. The development of new programs is not centrally coordinated or publicized. For example, the school of education might start a mentoring program unaware that another unit already had such a program and without the benefit of the earlier program's experience or expertise.

At present, a campuswide information system is not an option in resolving this information problem. The information system at ISU is the library OPAC system, LUIS II. The libraries have had most materials listed in the NOTIS OPAC, LUIS, since early 1985. About two years ago, the libraries acquired NOTIS' MDAS product for making additional bibliographic databases available alongside the OPAC, using the same searching commands. The databases now online are ERIC, divided into two files by date, and WILI, a combination of *Wilson's Business Periodicals Index*, *Humanities Index*, *General Science Index*, and *Social Science Index*. All databases on LUIS II are searchable using author, title, subject, and keyword indexing. The keyword mode includes Boolean queries, proximity operators, truncation, and field limiting.

LUIS II is available for dial-up; LUIS is available to anyone, but ERIC and WILI require a campus indentification number. This system is also available on the Internet. Within the next year, LUIS will also be available to Indiana University and all its campuses, as well as Purdue University, Indiana Vocational Technical Colleges, University of Notre Dame, Ball State University, and several other small colleges and universities in the state. Locally created databases mounted on the LUIS II system will eventually be accessible, too; although MDAS access is not planned for the beginning of the project.

The catalyst for the creation of the diversity database was a meeting of minds at a campus minority affairs round table in late 1990. Dr. Caldwell-Colbert, assistant to the vice-president of academic affairs, made a presentation and noted that there was not a single source on campus for information about diversity concerns. The author, who had become aware of this problem after involve-

Pat Ensor is Coordinator, Electronic Information Services, and Editor, *Information Standards Quarterly*, Indiana State University Libraries, Terre Haute.

ment in universitywide faculty-of-color recruitment efforts, pointed out that the library would be an excellent spot for coordinating a database listing these efforts. Excitement about the idea led the author to produce a proposal and database specifications that very night. However, the proposal took about a year to get through university bureaucracy. Approval to proceed with the project came in November 1991. This delay proved beneficial in two ways. First, the more the database was seen as a university project, rather than just a library effort, the more accepted and useful the database would eventually be. Second, the library system, and the state of standardization of information interchange formats, was not ready at that time to accommodate the database in the form it has now taken.

EARLY DECISIONS

Once permission was received to create the database, the author assembled a group of people, including representatives from the Library's Systems and Technical Services departments, a librarian who works in both Electronic Information Services (EIS) and Technical Services, and Dr. Caldwell-Colbert. This group validated the growing consensus that the database should include all types of information, current and archival; be mounted using the MDAS system; and be based on the draft Community Information Format for information interchange, based on Z39.2. The database would be publicized as a joint development of the library and the office of the vice-president of Academic Affairs, and functionally coordinated by EIS in cooperation with the groups mentioned above.

The database would contain all kinds of information, since there was no reason to pose arbitrary limitations on the types of entities that could be included. As long as the entity fell within the scope of database coverage, it would be included—organizations, programs, events, and individuals as the CIF describes, but also courses, scholarships, and other related information. The database would be entered into MDAS to provide access anywhere that the LUIS II library system was available. It would use the same interface to avoid having to teach users another search strategy.

The Community Information Format was adopted because it provided a ready-made format to encode material. The library staff wanted to support existing standards and anticipated a time when the records would be available through Z39.50-based PACLink and through the Internet to other libraries. Information would be accessible in a format somewhat familiar to current library users. The format was at an advanced stage of development, and its use was being encouraged by the Library of Congress and other groups in order to test its utility.

PREPARATION AND DEVELOPMENT

Steve Hardin, a librarian in EIS, selected fields from the draft document of the Community Information Format and created a template on a word processing program. He and the author discussed data they wanted to appear in the records and decided on some local conventions and small modifications (discussed below). They began to "catalog" items they had gathered on their own, simply entering them in the word processing template for the time being.

Systems personnel began to set up DION as a database through MDAS, profiling the database to contain the desired MARC fields by using slightly differently numbered fields. This change was necessary because NOTIS did not easily accept appropriate tags for the CIF. The EIS coordinator revised help screens to make them appropriate to the database, including giving contact information on the database NEWS screen, and EIS personnel decided how certain fields should be labeled. Since the database was not expected to be large, records were entered manually. The head of Monographic Cataloging set up a template record in the DION database to simplify record inputting, the final step before data entry began.

CIF MODIFICATIONS

The primary developers of the diversity database brought online searching and technical services experience to the project and tried to anticipate the needs of prospective users of the database. What would users want to know about an item? Did the CIF accommodate the data? If not, how should the format be modified for ISU's purposes?

The CIF provided for most data elements needed in DION records. One notable exception, though, is that CIF does not include a place to explicitly enter a word that designates

the entity type covered by a record. Fixed-field codes for kind of data (individual, organization, etc.) are defined in the leader. However, it did not seem reasonable to require users to do a keyword search on a single letter to locate all organizations in the database. Also, the CIF did not include codes for the broader array of entities in DION. The decision was made to define record types in brackets after the title of the item in the general material designation area of the record, and to add record types beyond the standard, such as course, scholarship, and text. This provision permits users to do a keyword search ("k=scholarship") and find all the scholarship listings in the database.

Another data element that ISU libraries decided to include in all records was a source of information. Coding did not conflict with the standard; a convention was created to designate the source of the information using field 500 (General Notes).

The Community Information Format does not make explicit provision for the inclusion of full text. To accommodate the full text of some local documents in the database, the decision was made to put full text in the description field of the record. This field is limited to 500 characters in NOTIS systems but is repeatable. To accommodate full-text records longer than the maximum record length, another copy of the record is made, with the only difference being that the second record contains the continuation of the full text. A designation in the first record indicates text is continued in another record, and a designation in the second record indicates text is continued from a previous record.

Current CIF practice is to use the 1XX fields as the primary designator for the majority of records, and the 245 field is not mandatory. However, each record in a NOTIS-based database must have a 245 field. Departing from CIF practice for individual and organization records, ISU catalogers enter the same information in fields 100/110 and the 245 field. In the case of an individual, the name is entered last name first in the 100 field and first name first in the 245 field. The fields are redundant, but system requirements are met, and the user can always retrieve with a title search.

None of these modifications makes the DION database unrecognizable to other CIF and open systems applications. ISU staff are committed to adopting the standard and changing the database, if necessary.

DATABASE CREATION

The coordinator and the librarian in EIS began to create records for items identified as being relevant to the database. At first, data were entered into the word processing-produced template, and a clerical worker subsequently entered data directly into the database after it was created by systems. Some records were entered directly into the database by the librarians.

The library was interested in demonstrating the DION database at the 1992 IBM INFORMA conference, so an effort was made to set up the database and enter 140 records in five weeks. This initial creation effort involved about eighty hours of combined effort by one and one-half librarians and a half-time clerical person. Records were created based on the contents of the items collected to represent the entity being cataloged. That is, if the source of information about the item being cataloged was a flyer, it was cataloged strictly on the basis of the flyer. The only other sources of information used were the campus telephone directory and the university course catalog. The catalogers also attempted to maintain an internal authority list, while also relying on the authorities in the online catalog, when applicable.

The final major decision in cataloging was which subject headings to use. It was decided to use the *Thesaurus of ERIC Descriptors* for subject headings. The library already had ERIC as one of its OPAC system databases, so there was some precedent for using its subject headings for another database. ERIC descriptors are much more suitable for the topics covered by the diversity database than are Library of Congress Subject Headings. Using ERIC descriptors has proven to be quite successful so far.

GATHERING INFORMATION

The gathering of information is an important component of the development of this database. It is amazing how much information can be gathered on a campus by simply being observant. Newsletters, newspapers, committee minutes, flyers, course catalogs, and telephone directories are all sources for this kind of database. Without publicizing the need for information, 200 to 300 items were gathered.

When the decision is made to publicly gather information for the database, there are several possibilities. The usual avenues of publicity on a campus can be used: newspaper ads, newsletter notices, flyers, memos, announcements in meetings, personal contacts. In addition, there is a notice on the news screen of the database telling people where to send information. Library instruction classes can also be an avenue of publicity. Getting on the mailing lists of organizations involved in the areas covered by the database is essential in keeping up with current events.

FUTURE PLANS

Electronic Information Services personnel continue to expand the database. DION will be widely publicized and released to the public in the fall of 1992. At that time, instructions on using DION and where to send information for inclusion will be explained to the campus public. Use of the database will be studied through transaction logs and librarians' contacts with patrons.

The database will probably reach a size of 400 to 500 items and be updated with current events items and the revision of existing entries. Current plans are to keep entries in the database even after the events have passed, with the idea that information in the records may be of some use to patrons. If, after a year, an entry is determined to be no longer useful, it will probably be suppressed from display. The future structure of the database will be based on the Community Information Format, but content will be determined by the needs of patrons. ■■

The USMARC Community Information Format: A History and Brief Description

Phyllis Bruns

The Library of Congress Network Development and MARC Standards Office (Net Dev/MSO) is concerned with the development, publication, and maintenance of the USMARC communications formats. This paper addresses the development of the newest USMARC format—the USMARC format for community information—and describes some specifics of it. It is important to note that Net Dev/MSO's work in this area over the last two and one-half years has been done in conjunction with the Technologies Committee of the Community Information Section of the Public Library Association; throughout this paper it will be referred to as the Technologies Committee. Cecelia Staudt, who is employed by EKI, Inc., was the chairperson of the committee during the time period.

Phyllis Bruns is Senior MARC Standards Specialist, Network Development and MARC Standards Office, Library of Congress, Washington, D.C.

DEFINITION

What is community information? The definition found in the community information format is as follows: Community information records describe nonbibliographic resources that fulfill the information needs of a community. Currently, the format allows one to describe programs, services, organizations, single and ongoing events, and individuals (e.g., experts, public officials) about which people in a community might want information. These entities can be for-profit, not-for-profit, or governmental, with a wide variety of missions or purposes (e.g., charitable, educational, informational, social, health, leisure), for a variety of audiences (children, youth, singles, men, women, alcoholics, mentally ill, criminal, etc.). A library itself could be included as an entity in a community information file.

A particular community information file could include entries for

- a baseball league for boys 11–12,
- an arts organization offering classes and exhibition space for artists,
- an alcoholic treatment center for persons aged 18–65,
- a nursery school for children,
- a Jewish war veterans group,

- an organization offering vocational and employment counseling,
- a women's shelter, or
- an annual fund drive to gather toys for needy children.

For each entry, the description could include the name of the entity, its address, telephone number, hours, fees, contact person, requirements for admission, etc.

It should be pointed out that a library other than a public library may maintain files of community information. Also, some libraries may only maintain one kind of community information. For instance, a university library may have a file of events going on at that university.

HISTORY

How did the format for community information come about? Around 1985, the Technologies Committee became aware that libraries were inputting their community information into machine-readable form. The committee compiled a directory of libraries having automated community services; twenty-seven libraries representing fifteen states were included.

In 1988 the committee subsequently contacted libraries known to be automating community information and asked them to furnish it with a list of the data elements they were using; the committee's goal was to develop a standardized list of community information data elements. In compiling the information received, the committee found that there were indeed elements common to community information users. The resulting standardized list can be found in appendix A. The committee did not consider the list exhaustive; rather, it considered the information representative of the information being referred to as "community information"—and it did provide a beginning.

In doing this work, the committee observed that a number of libraries with automated bibliographic systems were attempting to accommodate their community information files on the same system. Since community information is not bibliographic data, the information could not easily be input into bibliographic fields. Some vendors responded to this situation by creating separate database management modules with unique formats for use with nonbibliographic files; others adopted modified versions of their systems' bibliographic formats and integrated this information into the bibliographic files. Bibliographic formats do vary between different systems, but most systems today at least partially support the MARC bibliographic format. Figure 1 illustrates how one institution was recording community information using a modified version of the bibliographic format.

In late 1989, the Technologies Committee contacted the Network Development and MARC Standards Office at the Library of Congress. The committee was interested in a standard being developed on how to handle community information in machine-readable form. They wanted community information in machine-readable form to reside alongside machine-readable bibliographic records on the same database. If the two kinds of information were integrated, a person looking for information on how to treat teenagers with a drug problem could find not only books about the topic, but also the names and descriptions of agencies, programs, etc., dealing with this topic. The committee wanted all parties to code their community information records identically and wanted libraries to use MARC tags. The committee gave Net Dev/MSO a standardized list of data elements for community information and asked the office to accommodate the information in USMARC.

It should be noted that using a list of data elements as the basis for developing a new format or for making changes to a format (as was done in 1983 to the manuscripts format) is quite common. Usually, however, the list of data elements is related to a standard (e.g., a cataloging standard). No cataloging rules pertaining to the recording of community information existed. Although libraries were recording the same basic kinds of information, they were not always following the same capitalization, abbreviations (e.g., for the days of the week), punctuation, etc. In addition, the data elements were being recorded in various places in the record, sometimes combined with other elements, sometimes by themselves. Cecelia Staudt was asked at the time why the committee did not work on establishing a cataloging standard before trying to develop a MARC standard. She replied that people in the community were too far along in their automation projects.

In early 1990 Net Dev/MSO attempted to accommodate the data elements from the

245 10‡aWasatch front road runners‡cRichard Barnum-Reece, Contact Person

250 ⱥⱥ‡aP.O. Box 8344

260 0ⱥ‡aSLC, UT, 84108

300 ⱥⱥ‡a467-4203

500 ⱥⱥ‡aHOURS: Mon-Fri, 8-5

650 ⱥ0‡aRunning

650 ⱥ0‡aJogging

Figure 1. Community Information Recorded Using Modification of Bibliographic Format.

standardized list in the current USMARC bibliographic format using the existing books data elements, as well as suggesting new fields and subfields, and produced a document detailing how this could be done. The document was reviewed by the Technologies Committee at the June 1990 ALA Annual Conference. Net Dev/MSO and others who reviewed the document during the summer of 1990 were not entirely satisfied with trying to use the books format. Problems included:

- Since community information is not bibliographic information it did not legitimately belong in the bibliographic format.
- The books 008 Fixed-Length Data Elements field did not accommodate community information.
- Some of the mandatory bibliographic fields (e.g., the 300 Physical Description field) were not appropriate to community information and some (e.g., the 245 Title Statement field) were only appropriate in some instances; and
- Much of the information was going into a 500 General Note field.

In early December 1990, a two-day meeting was held to review more thoroughly the community information data elements in conjunction with USMARC. In attendance were community information providers, MARC specialists, library vendors, and academic and public librarians. At the beginning of the meeting it was announced that the ANSI Z39.2 standard, titled "Bibliographic Information Exchange," was being revised. The revisions called for, among other things, removing the word *bibliographic* from the name of the standard and opening up character position 07 of the leader so that it would no longer be defined as "Bibliographic level." The structure of USMARC communication records is based on the Z39.2 standard. The revisions to the standard meant that community information, a nonbibliographic type of information, could be legitimately handled in a separate format rather than being treated as an extension of the bibliographic format and erroneously being treated in terms of bibliographic information. From that point on, meeting participants thought of community information as belonging in a separate USMARC communications format.

At the December 1990 meeting, many decisions were made regarding the handling of community information data elements in the separate format, for instance, determining whether a particular element belonged in a separate field or in a subfield in a field with other data. The group tried to devise a 008 Fixed-Length Data Elements field for community information.

Following the meeting, Net Dev/MSO prepared a document detailing the possible configuration of a proposed new USMARC format for community information. This document reflected the decisions reached at the December meeting. It was subsequently reviewed by the Technologies Committee at the January 1991 ALA Midwinter meeting and further revised. The revised format formed

the main part of discussion paper number 50, titled "Proposed USMARC Community Information Format."

This paper was distributed to the USMARC Advisory Group for discussion at the June 1991 ALA Annual Conference. The principal component of the USMARC Advisory Group is the ALCTS/LITA/RASD Machine-Readable Bibliographic Information Committee, better known as MARBI, which is an ALA interdivisional committee made up of three members each from ALCTS, LITA, and RASD. Only these nine committee members can vote on proposals. The USMARC Advisory Group also consists of representatives from four utilities (OCLC, RLIN, Utlas, and the Western Library Network), from the North American National Libraries (Library of Congress, National Agricultural Library, National Library of Medicine, and the National Library of Canada), and from various library groups (e.g., the American Association of Law Libraries, the Online AV Catalogers, the Art Librarians Society of North America). The USMARC Advisory Group, as its name implies, is an advisory group that advises LC on all proposed additions and changes to the four communications formats, as well as on the addition of new formats. This group thoroughly reviews the specifications, including the repeatability of fields and subfields, descriptions, etc. The discussion paper was presented to this group in order to achieve consensus on the appropriateness of developing a new format for community information. This proposed new format was the first situation in which the group reviewed format documentation involving nonbibliographic information.

After reviewing the discussion paper, the USMARC Advisory Group agreed that there should be a separate format for community information and recommended that a USMARC proposal be written calling for the definition of such a format. The Technologies Committee, at a special meeting at the 1991 Annual Conference, thoroughly reviewed the format as presented in the discussion paper.

Following the Conference, the format was revised again to reflect the decisions reached by the various groups. In September 1991, a special one-day meeting conducted by the Technologies Committee was held to review the document once more. Following that meeting, the format was packaged as proposal 92-1, titled "USMARC Community Information Format." At the January 26, 1992, MARBI meeting, the USMARC Advisory Group reviewed and approved the proposal as amended as a provisional format. The group recommended that some parts of the proposal be changed, including the recommendation that a 007 field for fixed-field information pertaining to the disabled be created. On April 13, 1992, the Library of Congress approved the proposal.

Preparation for the publication of *USMARC Format for Community Information* is now under way. It will be similar to other USMARC format publications and will be available from the LC Cataloging Distribution Service in early 1993.

SPECIFICS ON THE PROPOSED NEW FORMAT

Leader

As can be seen in appendix B, the leader—the first twenty-four characters in a record—is similar in structure to the leader in the bibliographic format except that

- Leader/05 does not have codes "a—Increase in encoding level" and "p—Increase in encoding level from prepublication."
- Leader/06 has a code "q—Community information" defined.
- Leader/07 is defined as "Kind of data" (rather than as "Bibliographic level"). Note the kinds of data that can be coded in Leader/07.
- Character positions 17–19 are undefined.
- The leader in this new format is a very simple element.

0XX Variable Control Fields

Variable control fields constitute tags 001 through 008. These fields have no indicators or subfield codes. As can be seen in appendix C, fields 001, 003, and 005 are the same as in the bibliographic format. Note that

- There is a new 004 Dates Fixed Field.
- A 007 Fixed Field is to be defined pertaining to the disabled.
- The 008 Fixed-Length Data Elements field is 15 bytes in length.

Variable Data Fields

The variable data fields are those fields having a tag number of 010 through 880. These fields

have indicators and subfield codes, and these are the fields that accommodate the data listed in appendix A.

Blocks

Variable data fields are grouped into blocks according to the first character of the tag. The blocks in most instances identify the function of the data within the record. The blocks used in the proposed new format are shown in appendix D.

Note that

- The blocks are similar to those found in the bibliographic format.
- The access points upon which systems have indexes built (1XX, 4XX, 6XX, and 7XX blocks) are the same as in the bibliographic format.
- The name of the 1XX block is "Primary Name" because main entry is not a concept used by the community information community.
- The name of the 8XX block is not "Series Added Entry." This is because all series information is being handled in one field, field 440 Series Title.

Tags

As was mentioned, the first character of the tag, with some exceptions, identifies the function of the data within the record. The type of information in the field is identified by the remainder of the tag. Appendix E lists the variable data field tags found in the new format. There are sixty-eight tags listed. The scheme used in assigning tags to data elements was to use the same tag as found in the bibliographic format when the community information data were the same or similar to those in the bibliographic format, e.g., fields 052 (Geographic Classification Code), 511 (Participant or Performer Note), 546 (Language Note). As can be seen in appendix E, there is a great overlap of fields found in the bibliographic format. When a field was similar to that found in the bibliographic format, only those indicator values and subfield codes applicable to community information were carried over. For instance, in field 245 (Title of Event, Program, Etc.), the first indicator in the bibliographic format denoting whether or not the title is to be generated as an added entry, as well as subfields specifically defined for archival and manuscripts control, were not carried over to the community information format. When a data element could not be accommodated by an existing bibliographic tag, a nonbibliographic tag was designated.

As to some specifics about the tags:

- The 100–111 fields are similar to the fields in the bibliographic format. The fields have the same indicators and subfield codes as defined for books except that subfields relating to a title have been excluded.
- The 245 Title of Event, Program, Etc. field is not a mandatory field in this format. Most records will not have this field. This is because the 100–111 fields (except in the case of programs and events) will be considered more like bibliographic titles, i.e., they will contain the name of the entity being described. See appendix F for an example of a record having a 110 field. Most records for programs and events will have a 245 field; see appendix G for an example.
- In the 2XX block, there are three fields designated to contain address information: Fields 270 (Primary Address) and 271 (Additional Addresses) will be used in conjunction with the name found in the 100–111 field (see appendix F for an example). Fields 270 and 271 will both be present in a record when an entity has more than one address; for instance, when it has a mailing address and a physical location address or when it has more than one office. Field 275 (Address Associated with Event, Program, Etc. Title) will be used in conjunction with the 245 Title of Event, Program, Etc. field (see appendix G for an example).
- In the 4XX block, note that there is only one series field, field 440 (Series Title), presently defined.
- In the 5XX block, there are twenty-one note fields. The community wanted such note fields as such fields will be used as prompts on work screens. It is anticipated that fields 520 (Description, Etc. Note) and 531 (Eligibility, Fees, Procedures Note) will be highly used fields.

It should be pointed out that a USMARC Discussion Group of the Community Information Section of the Public Library Association has been formed. Cecelia Staudt is the chairperson. This group was formed to advise the Library of Congress on the new community information format, particularly regarding future additions or changes that may be needed. The group met initially at the June

1992 ALA Annual Conference and will continue to meet at the ALA Annual and Midwinter Conferences. The meetings are open to anyone interested in the new format. ■■

APPENDIX A. STANDARDIZED LIST OF DATA ELEMENTS FOR COMMUNITY INFORMATION

Accessibility
Additional Address Locations
Affiliation (membership; parent organization)
Annual Budget
Application for Service (required documents)
Cataloging Record Source
Child Care
Classification Number
Control Number
Date of Record (original entry date/date record updated)
Director's/Administrator's Name
Eligibility Requirements
Fee
Former Name(s)/Acronym(s)
Funding Source
Geographic Area/Location Served (in text and in coded form)
Handicapped Accessibility
Hours of Operation
Human Service Number
Languages in which Services are Provided (in text and in coded form)
Languages Spoken by Staff (in text and in coded form)
Licensing/Accreditation
Meeting Room/Facilities/Equipment
Meeting Times
Mission Statement/Purpose
Mutual Support Groups
Name of Public Contact Person
Officer Names/Advisory Board Members/Peer Advisory Group
Primary Address
Program Description/Description of Services
Programs (titles)
Publication Titles
Size of Staff
Speakers Bureau
State
Subject Headings
Target Group
Telephone Number—including TTD, FAX, 800 number; electronic mail address
Title of Organization (program name/popular name)
Volunteer Opportunities
Waiting List
Year Established/Founding Date
Zip Code

APPENDIX B. LEADER

USMARC Community Information Field	USMARC Bibliographic Field
00–04 Logical record length	00–04 Logical record length
05 Record status c Corrected or revised f Deleted n New	05 Record status c Corrected or revised d Deleted n New a Increase in encoding level p Increase in encoding level from prepublication
06 Type of record q Community information	06 Type of record (codes a–g, i–k, m, o, r)
07 Kind of data n Individual o Organization p Program or service q Event z Other community information data	07 Bibliographic data (codes a–d, m, s)
08–16 (same as for the bibliographic format)	
17–19 Undefined	17 Encoding level 18 Descriptive cataloging form 19 Linked record requirement
20–23 (same as for the bibliographic format)	

APPENDIX C. VARIABLE CONTROL FIELDS

USMARC Community Information Field		USMARC Bibliographic Field	
001	Control Number	001	Control Number
003	Control Number Identifier	003	Control Number Identifier
004	Dates Fixed Field 00–07 Action date 08–15 Purge date 16–23 Beginning date of event or program		
005	Date and Time of Latest Transaction	005	Date and Time of Latest Transaction
007	(To be defined for elements pertaining to the Disabled)	007	Physical Description Fixed Field
008	Fixed-Length Data Elements 00–05 Date entered on file 06 Volunteer opportunities 07 Volunteers provided 08 Child care arrangements 09 Speakers bureau 10 Mutual support groups 11 Meeting rooms and facilities available 12–14 Language	008	Fixed-Length Data Elements (40 characters in length)

APPENDIX D. BLOCKS

USMARC Community Information Format		USMARC Bibliographic Format	
0XX	Control Information, Numbers, and Codes	0XX	Control Information, Numbers, and Codes
1XX	Primary Name	1XX	Main Entry
2XX	Titles, Addresses	2XX	Titles and Title Paragraph
3XX	Physical Information, Etc.	3XX	Physical Description, Etc.
4XX	Series Information	4XX	Series Statements
5XX	Notes	5XX	Notes
6XX	Subject Access Fields	6XX	Subject Access Fields
7XX	Added Entries Other than Subject	7XX	Added Entries Other than Subject or Series; Linking Fields
8XX	Alternate Graphics	8XX	Series Added Entries, Etc.
9XX	Reserved for Local Implementation	9XX	Reserved for Local Implementation

APPENDIX E. VARIABLE DATA FIELDS

USMARC Community Information Field		USMARC Bibliographic Field	
01X	*Numbers and Codes*	*01X*	*Numbers and Codes*
010	Library of Congress Control Number	101	Library of Congress Control Number
035	System Control Number	035	System Control Number
040	Record Source	040	Cataloging Source
041	Language Code	041	Language Code
043	Geographic Area Code	043	Geographic Area Code
050	Library of Congress Classification Number	050	Library of Congress Call Number
052	Geographic Classification Code	052	Geographic Classification Code
058	Other Geographic Classification code		
060	National Library of Medicine Call Number	060	National Library of Medicine Call Number

continued

066	Character Sets Present	066	Character Sets Present
070	National Agricultural Library Call Number	070	National Agricultural Library Call Number
072	Human Services Code	072	Subject Category Code
073	Type of Program or Organization Code		
080	Universal Decimal Classification Number	080	Universal Decimal Classification Number
082	Dewey Decimal Classification Number	082	Dewey Decimal Call Number
084	Other Classification Number	084	Other Classification Number
09X	Local Call Numbers	09X	Local Call Numbers
1XX	*Primary Name*	*1XX*	*Main Entry*
100	Primary Name–Personal	100	Main Entry–Personal Name
110	Primary Name–Corporate	110	Main Entry–Corporate Name
111	Primary Name–Meeting	111	Main Entry–Meeting Name
2XX	*Titles, Addresses*	*2XX*	*Titles and Title Paragraph*
245	Title of Event, Program, Etc.	245	Title Statement
246	Varying Title of Event, Program, Etc.	246	Varying Form of Title
247	Former Title of Event, Program, Etc.	247	Former Title or Title Variations
270	Primary Address		
271	Additional Addresses		
275	Address Associated with Event, Program, Etc. Title		
3XX	*Physical Information, Etc.*	*3XX*	*Physical Description, Etc.*
301	Hours, Etc.		
303	Specifics of Subordinate Entities		
311	Meeting Rooms and Facilities Available		
312	Equipment Available		
4XX	*Series Information*	*4XX*	*Series Statements*
440	Series Title	440	Series Statement/Added Entry–Title
5XX	*Notes*	*5XX*	*Notes*
500	General Notes	500	General Notes
501	Currency of Information Note	501	With Note
505	Specific Programs Note	505	Formatted Contents Note
511	Participant or Performer Note	511	Participant or Performer Note
520	Description, Etc. Note	520	Summary, Abstract, Annotation, Scope,. Etc. Note
521	Target Group Note	521	Target Audience Note
522	Geographic Area Note	522	Geographic Coverage Note
531	Eligibility, Fees, Procedures Note		
536	Funding Source Information Note	536	Funding Information Note
545	Biographical or Historical Note	545	Biographical or Historical Note
546	Language Note	546	Language Note
551	Budget Information Note		
570	Personnel Note	570*	Editor Note
571	Volunteers Note		
572	Affiliation and Other Relationships Note		
573	Licensing and Accreditation Note		
574	Travel and Directions Note		
575	Structural and Other Accomodations for the Disabled Note		
576	Generic Programs and Services Note		
581	Publications Note		
587	Other Information Available Note		
6XX	*Subject Access Fields*	*6XX*	*Subject Access Fields*
600	Subject Added Entry–Personal Name	600	Subject Added Entry–Personal Name
610	Subject Added Entry–Corporate Name	610	Subject Added Entry–Corporate Name
611	Subject Added Entry–Meeting Name	611	Subject Added Entry–Meeting Name

630	Subject Added Entry–Publication Title	630	Subject Added Entry–Uniform Name
650	Subject Added Entry–Topical Term	650	Subject Added Entry–Topical Term
651	Subject Added Entry–Geographic Name	651	Subject Added Entry–Geographic Term
653	Index Term–Uncontrolled	653	Index Term–Uncontrolled
654	Subject Added Entry–Faceted Topical Terms	654	Subject Added Entry–Faceted Topical Terms
655	Index Term–Genre/Form	655	Index Term–Genre/Form
656	Index Term–Occupation	656	Index Term–Occupation
657	Index Term–Function	657	Index Term–Function
69X	Local Subject Access Fields	69X	Local Subject Acces Fields
7XX	*Added Entries Other than Subject*	*7XX*	*Added Entries Other than Subject or Series; Linking Fields*
700	Added Entry–Personal Name	700	Added Entry–Personal Name
710	Added Entry–Corporate Name	710	Added Entry–Corporate Name
711	Added Entry–Meeting Name	711	Added Entry–Meeting Name
730	Added Entry–Publication Title	730	Added Entry–Uniform Title
740	Added Entry–Specific Program Title	740	Added Entry–Uncontrolled Related/ Analytical Title
79X	Local Added Entry Fields		
8XX	*Alternate Graphics*	*8XX*	*Series Added Entries, Etc.*
880	Alternate Graphic Representation	880	Alternate Graphic Representation

* A field made obsolete with format integration

APPENDIX F. ORGANIZATION

Leader/06: **q** (Community information)
Leader/07: **o** (Organization)

001 <control number>

003 <control number identifier>

004 199311uulllllllllllllllllllll

005 <date and time of latest transaction>

008 930608aaaaaaeng

040 **bb**‡a<NUC symbol>‡c<NUC symbol>

110 **2b**‡aWasatch Front Road Runners.

270 **bb**‡aP.O. Box 8344‡bSalt Lake City‡cUT‡e84108‡k467-4203‡pRichard Barnum-Reece

301 **bb**‡aM-F, 8-5.

500 **bb**‡aSERVICES: Runners organization.

501 **8b**‡aDate revised: 9/93.

531 **bb**‡bFees for membership/newsletter.

581 **bb**‡aPublishes the newsletter The Utah runner and cyclist.

587 **bb**‡aSPORTS ORGANIZATIONS: CIF pamphlet file.

650 **b0**‡aRunning.

650 **b0**‡aJogging.

730 **0b**‡aUtah runner and cyclist.

APPENDIX G. EVENT

Leader/06 q (Community information)
Leader/07 q (Event)

001 <control number>

003 <control number identifier>

004 ␣␣␣␣␣␣␣␣19931002199310011993 1001

005 <date and time of latest transaction>

008 930816anannneng

040 ␣␣‡a<NUC symbol>‡c<NUC symbol>

245 ␣0‡aContemporary Music and Inter-disciplinary Music Theatre.

275 ␣␣‡aRadcliffe Dance Center, Agazziz House‡k437-2247

301 ␣␣‡aOct. 1, 1992, 2 p.m.

440 ␣0‡aLearning through performers program

511 ␣␣‡aA lecture/demonstration by Paul Dresher and Rinde Eckert, composers and members, Paul Dresher Ensemble.

520 8␣‡a"About 'Pioneer', which examines the burden of the American frontier past and the uncertainty of the future through Dresher's innovative electronic score and Ekert's arrangement."

531 ␣␣‡bGeneral admission, $6.00; free for Harvard and Northwestern faculty, staff, and students; half-price discount for seniors, students, and advance sales buyers.

650 ␣0‡aTheatre.

MARC and I & R

Douglass Gray

If you want to have a successful Information and Referral (I & R) program in your library, it does not matter if you use the Community Information Format (CIF). Successful I & R is not about formats. The design of your database should be driven by the external needs of your users, not the internal constraints of cataloging and computers.

I am going to describe the Shorebirds I & R project, and the developing plans in Maryland for statewide sharing of I & R resources.

The Eastern Shore of Maryland consists of eight rural counties on the Delmarva Peninsula, separated from the Baltimore-Washington corridor by the Chesapeake Bay. The separation is far more than a geographical one. Last year, the governor infuriated Eastern Shore constituents by asking a legislator, "How's that outhouse of an Eastern Shore?" A resident, appreciative of the governor's concern, quickly responded with the generous gift of a corncob for the governor's personal use. The people of the Shore dislike the rest of the state of Maryland, and the feeling is reciprocated. In fact, some Shore residents have seriously argued for the Shore to secede from the rest of the state. The residents are proud, fiercely independent, and desire most of all to be self-sufficient, without help, assistance, or intervention from foreigners across the bay.

Because of this independent attitude, it is important that information and services be provided to the residents locally. It means that when you refer people to the American Cancer Society, you refer them to the American Cancer Society chapter in their own county or shorebased facility, not to the statewide organization with headquarters in Baltimore. This independence was one of the guiding factors in the creation and development of our information and referral database.

SHOREBIRDS—I & R FOR EIGHT COUNTIES

In 1989 the eight public libraries of the Eastern Shore each had a card file or database of community information. The majority of the files had not been updated adequately in several years, were in different formats, and contained a variety of information levels. Two councils composed of librarians and social service workers agreed on a centralized database of information to provide:

- Standardization of format and content for participating libraries.
- Coordinated and ongoing updating of the information.
- The development of networking with local social service agencies.
- Ease of access and completeness of information for end users. (In fact, we wanted a resource that could easily be used by the average patron or library director).

Finally, the database would provide a means of promoting the commonality of information, while allowing for the diversity of data. The project that ensued became SHOREBIRDS, or ShoreBased Information and Referral Delivery System. The database presently contains 3,000 records of clubs, organizations, and programs on the Shore.

A standardized format was instituted with centralized data entry and the adoption of the proposed Community Information Format as a map for development of our database. The database is not presently in MARC format, but in order to achieve a smoother transition to MARC, we have tried to copy as much of the appearance and structure of the CIF as possible.

We did not actually begin to use the CIF for two reasons: on the Shore there is only one automated library system among the eight counties that form our region, and the vendor has yet to release a separate module for CIF. Further, there is at present no dial-up capacity for the system, so that even if we had developed our database on the system, we would not have been able to network with the social service agencies. We wanted to become partners with the social service agencies in the provision of information and referral data, and they could not access the online system without dial-up lines.

Since access to the I & R data via the online system was impractical, we considered issuing the database on CD-ROM, using a commercial retrieval package. Unfortunately, again access for social service agencies to this resource would be prohibitively expensive. The cost of software and hardware was

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beyond the reach of our local agencies. In the end, we found that the best way for us to distribute the data was to write our own retrieval program and distribute the data in dBase format. Using the CIF as a map, however, will allow us to convert the files when a suitable platform is available.

PLAN FOR STATEWIDE I & R DATABASE

During the coming year, it has been proposed that we begin to build a statewide database in Maryland for I & R records. There are several advantages to building a larger, shared database at the statewide level, including the elimination of duplicate effort by libraries and agencies, broadening of the scope of the database, and creation of a more cost-effective tool. Having developed a database for eight counties in one geographical area, we readily see the obstacles to the development of a larger, shared database. Among the lessons learned from the development of the SHOREBIRD database were:

- It is important to receive input from both libraries and social service agencies in determining the definition and scope of the required data for information and referral.
- End user access is more important than database record format. Staff training is an essential foundation for eliminating barriers to access.

CRITERIA FOR A SHARED I & R DATABASE

1. *Common format.* We plan for cooperating counties to use the Community Information Format. At present there are five or six formats in use. The CIF standard is the most complete and cohesive approach to description of community information.

2. *Systemized data collection and updating.* Everyone needs to obtain the same type of information for their I & R records. We are presently developing a data-collection form based on the CIF, and the CIF discussion group will also be examining data collection. We have found that it is essential to receive assistance at the local library and agency level to best obtain information about available resources.

3. *Authority control.* It is far easier for variant agency names to be promulgated than the many variants we often see in bibliographic databases lacking proper authority control.

4. *Minimum record length.* Establish minimum record criteria while allowing for the diversity of information being delivered. At the very least, include some way to contact the agency.

5. *Standardized subject access.* There are a variety of sources for subject headings. Many people find LC subject headings for CIF inappropriate. We have developed a standardized list of subject headings for Maryland based upon the Infoline Taxonomy, but greatly simplified.

6. *Governance.* The most important need is to develop a governance mechanism by which the data can be maintained. Community information files cannot be created and forgotten.

7. *Platform.* Of course, you need a platform on which to store the information. For Maryland we have several options, including MILNET (which contains our statewide bibliographic database) or storing it on one of the available databases with dial-up access.

In conclusion, it is of utmost importance that flexibility of requirements be maintained while upholding the need for a minimal record. Users, whether on the Eastern Shore of Maryland or in Baltimore, need to have access to information that meets their needs—not what a centralized authority defines as appropriate. We are developing access to information for our customers. The CIF can be used as a tool to make a database more complete and to provide easier access, but it should not drive the process of I & R. The process of I & R should mold the shape and format of the database. ■■

Community Information and Automated Library Systems

Patrick J. McClintock

The representation of community information, or information and referral (I & R), records in machine-readable form in online electronic databases was a concern for vendors and users of automated library systems for several years prior to the development of the MARC format for community information. This article characterizes the responses of vendors of automated library systems to questions regarding their attitudes about and plans to accommodate the new format, and describes the capabilities of their systems for storing and providing access to machine-readable community information records. A brief discussion of some issues related to the use of online community information is also included.

BACKGROUND

When the Public Library Association (PLA) Community Information Section (CIS) Technologies Committee began in the late 1980s to consider the development of a set of common data elements for I & R records, there was little consistency in the ways libraries and other institutions dealt with online I & R. Libraries that provided outreach services or were active referral agents were probably most interested in maintaining online I & R databases, and most of those databases were probably represented on microcomputer-based systems utilizing locally developed software. Individual libraries determined the data elements that constituted online I & R records. As the use of automated library systems, especially turnkey integrated systems (those sold by vendors as a package including hardware and software), began to increase, the number of libraries interested in online I & R also began to increase. In addition to libraries and other institutions that emphasized the referral side of I & R, there were now those interested in representing and providing access to files and records of local agencies, clubs, organizations, etc.—the Rolodex files on the desk of the reference department. For a library with an automated system and its online bibliographic database accessible by staff and patrons, it was logical to attempt to convert manual I & R files to machine-readable form, even though they had to be "shoehorned" into the database record format designed for bibliographic information. Each library still decided on an individual basis on the data elements to be contained in the records and the bibliographic record fields that contained the data.

It was with these issues and developments in mind that the CIS Technologies Committee began to develop a set of common data elements for I & R records. With the encouragement of AVIAC, the ad hoc Automation Vendor Information Advisory Committee, the Technologies Committee submitted the set of data elements to LC's Network Development and MARC Standards Office and asked that a new MARC (Z39.2) format incorporating the data elements be developed.

SYSTEM VENDORS AND I & R

Automated systems and system vendors have played a continuing role in the development and use of online I & R records, but it has not been until recently that the role has been active. Representatives of automated system vendors participated in the final development of the format by the CIS Technologies Committee, and the role of AVIAC was mentioned above. As the new record format was being developed, an interest was expressed in how vendors deal with I & R functions and records, and what they thought about the new format.

The program for the PLA third national conference in March 1991 included a presentation on the new format, "New Directions for I & R in the 90s," in which the views of automated system vendors were characterized. Information for the presentation was obtained by issuing a request for information (RFI) to all system vendors. The RFI was reissued in January 1992, and the results reported in a presentation at the Illinois Library Association annual conference in March 1992. Those same results were incorporated for the June 1992 ALA presentation, on which this article is based.

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Several points about vendors' responses to the RFIs:

- The group of vendors represented here is not inclusive. Attempts were made to send RFIs to all system vendors; not all responded.
- The text and level of understanding of specific answers was determined by the person in the organization who wrote the answer and may not necessarily reflect a company's formal position.
- The capabilities and attitudes expressed here are not current for some vendors. As the new format gains a foothold and is better understood, we can expect vendors to adapt their systems to (and attitudes about) the format.

Regarding the last point, new information from vendors is being received as this article is being written. In addition to automated system vendors, data-conversion services vendors received the latest RFI and will respond to conversion-related questions about the new format.

The purpose of getting vendors' views about the new format is generally to characterize activities and attitudes of a group that will be involved in the implementation and ultimate success and acceptance of the format. No judgment about individual vendors is made or suggested; if you want to know what your favorite vendor is doing about the new format, ask today. There is a good chance the answer will be different from what was said yesterday, because the industry is changing that fast.

Sixteen system vendors responded to the January 1992 RFI; one vendor acknowledged receipt of the RFI, but chose not to respond. Appendix A lists in alphabetical order the vendors that responded. Most, if not all, of the names will be familiar to those who deal with automation. The list includes several vendors of microcomputer-based systems.

THE QUESTIONS

Vendors were asked to respond to questions that addressed these general issues:

- System capabilities for handling I & R records, and whether I & R (or some similarly named function) exists as a separate software module
- Awareness on the part of the vendor about the new format (at the time, proposed format)
- Attitudes about the need for a standard and whether it should be USMARC
- Vendors' willingness to incorporate the new standard in their systems

Appendix B shows the questions to which vendors were asked to respond.

HOW DO VENDORS OF AUTOMATED SYSTEMS DEAL WITH I & R?

Table 1 summarizes the vendors' responses. Of the 16 vendors responding, 15 had some way to deal with I & R or community information records. Follett, the one vendor that did not, was developing an I & R application. The remaining vendors had functions that provided for the creation, storage, and maintenance of I & R records in databases, with one exception: Gaylord said its system supports only free-text I & R records. Of the 15, 6 said they have separate modules, subsystems, or applications for I & R, and 9 others do not.

How are the records stored? Eight vendors' systems provide for separate files or databases for I & R records, 2 vendors mix I & R and bibliographic records in single files or databases, and 2 vendors can do either. The responses of the 3 remaining vendors were not clear.

Interestingly, 4 vendors said their systems accommodate the new format, although at the time the format was still in development. Another 8 systems accommodate I & R records in MARC format, presumed to be a bibliographic format modified for I & R purposes, and 2 vendors said their systems store I & R records in a MARC-like format (using MARC fields and tags, but without leader and directory, perhaps?). As mentioned earlier, Gaylord said it stores I & R records in free-text format; NOTIS responded that its system stores I & R records in either MARC (bibliographic) or free-text format. All 15 vendors said their systems are designed to provide access by users to I & R records through the standard query functions of their online catalog systems.

HOW DO VENDORS FEEL ABOUT STANDARDS FOR I & R?

Of the 16 vendors who responded, only 1 was unaware of the proposed format being developed at the time. All others indicated some level of awareness and understanding of the format development. Fifteen vendors agreed that there is a need for a standard record format for I & R; one was uncertain. As to

Table 1. Summary of Vendors' Responses to Questions Regarding I&R

	1	2	3	4	5	6	7	8	9
	Vendor	Separate I & R Appplication?	Format of I&R Records	Users of I & R System	Development Planned?	Aware of Proposed Standard?	Need for Standard?	USMARC Format Appropriate?	Adopt Standard?
1	CARL	Y	MARC-like	11 sites	Y	Y	U	U	U
2	CLSI	N	New Standard	Over 100	Y	Y	Y	Y	Y
3	CoBIT	N	New Standard	1–4	N (Complete)	Y	Y	Y	Y
4	DRA	Y	MARC	Unknown	Y	Y	Y	Y	Y
5	Dynix	Y	Library-definable	22 (41)	Y	Y	Y	N	Y
6	Follett	N	Not Yet Determined	Unknown	Y	Y	Y	Y	Most Likely
7	Gaylord	N	Free Text	77	Y	Y	Y	Y	Y
8	Gateway	N	MARC	Unknown	Y	N	Y	Y	Probably
9	Inlex	Y	New Standard	2	Y	Y	Y	Y	Y
10	III	Y	MARC	10	N (Complete)	Y	Y	Y	Y
11	Library Corp.	N	New Standard	1	Y	Y	Y	Y	Y
12	MultiLIS	N	MARC-like	10	Y	Y	Y	Y	Y
13	NSC	N	MARC	0	Y	Y	Y	Y	Y
14	NOTIS	N	MARC Free Text	Unknown	N	Y	Y	N	Y
15	Sirs	N	MARC	50	Y	Y	Y	Y	Y
16	VTLS	Y	MARC	1	Y	Y	Y	Y	Y

Key: Y = Yes
N = No
U = Uncertain

whether MARC (Z39.2) was the appropriate format, there was less agreement; 13 vendors thought MARC appropriate, one was uncertain, and 2 said MARC was not appropriate. When asked if they would implement the standard format if it were adopted, 15 vendors said they would, and 1 was uncertain.

KEY ISSUES

The community information record format is the first MARC format for nonbibliographic data. As libraries increasingly add nonbibliographic data to online system environments (local databases like I & R files, collection-specific indexes like newspaper indexes, periodical citation indexes linked to serials holdings) how will the format(s) for those data files and records be determined? Will there be a need for more nonbibliographic standard formats? The community information format came out of a process that involved a group of librarians that had shared interests in I & R and saw the need for common data elements in a standard format. Will there be similar processes that lead to the development of other formats? If there are not, we can expect that individual libraries will design their own unique formats or that, more likely, vendors of automated systems will determine the formats of records that their customers want to load and provide online access.

As with bibliographic databases, the creation of machine-readable databases of I & R records will present owners with issues of database management and access. Catalogers who know, understand, and conform to agreed-upon rules are responsible for our online bibliographic databases; will they also now be responsible for nonbibliographic data? Who will develop the cataloging rules and data definitions for I & R records that do not yet exist?

The availability of nonbibliographic data in online databases that can be accessed by patrons and staff raises questions about authority control. If I & R records consist predominantly of information about local institutions, agencies, and groups, there is not likely to be a source of authorized forms of names that occur in records, just as there are likely to be local subjects assigned to I & R records for which there is no source of authority. Libraries with I & R databases may find they develop more and more local authority records as they add records. Automated systems will all have to provide the capability for creation and maintenance of local authority records in the MARC format.

As the new MARC format becomes the accepted standard for I & R, will there be a massive conversion effort by those libraries (and their system vendors) that have created I & R records using MARC bibliographic and non-MARC formats? For some libraries, the level of effort to rekey I & R records will be formidable. Data-conversion vendors, some of whom have undertaken large-scale projects involving retrospective conversion of I & R records (but not to the new format), may find new sources of revenue in conversion of I & R records. It is obviously imperative that conversion vendors adopt the new format, but with no detailed cataloging rules and no exact definition for data elements, there is a certain amount of risk in utilizing a standard that is dynamic and will require several years of usage before it begins to stabilize.

The NISO Z39.50 protocol for information retrieval will have an impact on how I & R records are created and accessed. Intended primarily to accommodate transfer of bibliographic records between disparate systems, the Z39.50 standard, when adopted by vendors, will also provide for system interconnection for database query, and that will include online I & R records where they exist. The methods for indexing, displaying, and otherwise handling bibliographic records have become somewhat standard in automated library system environments, and linking systems for query by users will result in some level of consistent retrieval. The use of Z39.50-based interfaces to access I & R data across disparate systems will require standardizing and indexing structures for I & R records to get identical results.

Because the new format is designed to accommodate online I & R records, those libraries that provide I & R services (either the I, the R, or both) will probably know how they want to use the format. From early on in the development of the format, there have been questions about other potential uses of the format. During one discussion about the intended use of the format, one librarian expressed a desire to be able to create machine-readable records about local corporations, including annual reports and financial statements. How many potential users are there who will stretch the format to accommodate

new and otherwise unperceived uses? What do end users want? If we provide access to I & R records through the public catalog or other patron interface, we have a responsibility to make sure the user has a context for understanding the data and information that is presented. The question of how I & R records are stored and accessed in online systems is important for the information environment we want to create for users. Vendors may find that providing ease of use means separate databases or data files for different types of records (i.e., separate bibliographic and nonbibliographic files) and even separate modules, systems, or applications to provide a context for use of I & R and other nonbibliographic records. ■■

APPENDIX A.
VENDORS RESPONDING REGARDING I & R PLANS, CAPABILITIES

CARL Systems, Inc.
CLSI, Inc.
Council for Bibliographic and Information Technologies (CoBIT)
Data Research Associates, Inc.
Dynix, Inc.
Follett Software Co.
Gateway Software Corp.
Gaylord Information Systems
Inlex, Inc.
Innovative Interfaces, Inc.
The Library Corp.
Sobeco, Inc. (MultiLIS)
NSC, Inc.
NOTIS Systems, Inc.
Sirsi Corp.
VTLS, Inc.

Replying But Not Responding:
Data Trek, Inc.

APPENDIX B.
QUESTIONS FOR VENDORS REGARDING I & R

Question 1
Does your system currently provide applications software for I & R functions as a separate module?

If "yes," please describe the format for system records (i.e., MARC, MARC-like, ASCII) and indicate if and how I & R records are queried through your system's online catalog or online search capability.

If "no," please indicate if and how I & R records may be accommodated by your system, describing record formats and means of providing access to I & R records (see above).

Question 2
Please provide estimates of the number of buyers or users of your system (single host site counted as one use) who maintain and provide access to online I & R records and/or files.

Question 3
Do you plan to develop capabilities or enhance existing capabilities for handing I & R records?

If "yes," please describe briefly the intended result of such development or enhancement.

Question 4
Is your company aware of the development of a proposed USMARC standard record format for I & R records?

Question 5
Do you feel there is a need for a standard record format for I & R records?

Question 6
Do you feel that USMARC is an appropriate format for online I & R records?

Question 7
If a standard format for I & R records is adopted, will your company incorporate the standard into your system software?

Special Section: Happy Birthday to MELVYL® (Part 3)

The Next Generation of Public Access Information Retrieval Systems for Research Libraries: Lessons from Ten Years of the MELVYL System

Clifford A. Lynch

This paper views the design of the next generation of public access information retrieval (IR) systems in higher education from the perspective of a decade of development, deployment, and operation of the MELVYL online system at the University of California (UC). It highlights design decisions and assumptions that were made for the MELVYL system that have proved advantageous, as well as those that have proved limiting or have led to dead ends. Our design choices were probably similar to those made by most other online catalog designers at the time. Some decisions at UC that have proved in hindsight to be shortsighted or cowardly (and also a few that proved better than we might have hoped) were only guesswork, because there was no base of experience from which to work. Other decisions were artifacts of limited functionality and capability from the underlying base of information technology upon which the catalog was built, or of a limited budget to acquire resources. Particularly in the case of computing hardware, it was not that desired technology did not exist ten years ago (unlike certain supercomputing applications—visualization being the most striking example—that emerged during the 1980s), but that the cost of the desired computing cycles, memory, and mass storage was out of reach. Costs of these resources have dropped now sufficiently that they can be used more freely as we consider systems for the 1990s.

The available base of software technology was a different matter. The limited functionality in the software components, such as database management systems (DBMS), that might be used to build an online catalog was a serious problem. In 1980, the DBMS choices were few, and none of them was entirely satisfactory. Interestingly, as we consider future directions for the MELVYL system in 1992, the choices seem to have improved little in terms of functionality, although the available commercial software has matured considerably in terms of stability and performance. The full set of functionality still seems tantalizingly out of reach, manifested most broadly in database systems that remain as research vehicles within the computer science research community, and thus unsuitable for production use in a system the scale of the MELVYL catalog.

Finally, in terms of delivery platforms, we viewed the system as limited by the installed base of character mode ASCII terminals and so designed to the lowest common denominator "glass teletype." In theory, we might have procured a special terminal for use with the MELVYL system (as some other systems had done), since, as discussed in more detail later, our initial assumption was that most terminals for catalog access would be placed in libraries. But we felt it was important to be able to support the installed base, presuming that networking on the UC campuses would continue to improve and that over time more of this installed base would be able to reach the catalog. Given the explosion of networking that occurred later in the 1980s, this proved to be a very wise decision as it greatly facilitated wide access to the catalog.

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The history and current status of the MELVYL system has been amply covered in the papers that have appeared in the two previous "MELVYL at Ten" special sections of *Information Technology and Libraries* and in the spring 1992 issue of the *DLA Bulletin*. But a review of the design assumptions and system objectives for the original MELVYL online catalog, many of which, to my knowledge, were never explicitly articulated and debated as part of the planning process prior to its development, forms an essential part of the context for this paper. Thus, the first part of the paper reviews them with the benefit of ten years of hindsight, along with certain realities of the information technology base of the late 1970s. The remainder of the paper focuses on key problems that emerged as we gained experience with patron use of online catalogs at UC and elsewhere, and as the MELVYL system has grown larger, more complex, and more capable. As we consider requirements for future systems and the future evolution of the MELVYL system itself, I believe that we must revisit some of the basic assumptions. Thus the paper concludes with a discussion of some of the new possibilities opened up by altering the fundamental assumptions that guided the development of the MELVYL catalog in 1980.

DESIGN ASSUMPTIONS AND OBJECTIVES OF THE ORIGINAL MELVYL ONLINE CATALOG

The first and most important thing to recognize about the original design assumptions underlying the MELVYL catalog of the early 1980s was that it was designed to be an online catalog. It was not envisioned as a more general information access system. There was no discussion of including abstracting and indexing (A & I) databases (beyond speculation that this might be a desirable expansion in some distant future), full text, or images, and there was no thought of having the system serve as a gateway to a wide range of information resources (both academic and commercial) available through the network. At the time, there was no real national, much less international, network that would have made such a gateway function possible even if it had been deemed desirable. In fact, when the MELVYL catalog appeared on the DARPA Internet in the mid-1980s, it was one of the first online catalogs to be publicly accessible through the Internet and thus helped establish the precedent that led to the availability of a rich collection of public access Internet-accessible resources today.

When the MELVYL catalog was being planned, there were few examples of operational online catalogs to guide the development, and those that existed were both so new and so poorly instrumented that little information could be gathered about how library patrons used these new tools, other than that most users of online catalogs seemed fairly enthusiastic about them.[1] The MELVYL catalog was conceived of as a conservative, straightforward mechanization of an existing physical card catalog, since the traditional card catalog was a well-proven, well-understood access tool, despite its limitations.

The functions designed into the MELVYL online catalog closely mirror those found in traditional card catalogs: searching by author, subject, and title. Keyword access, as an alternative and supplement to exact searching of author, title, and subject fields, was perhaps the major innovation visible to the user. In the early days, there was substantial controversy about whether it was worthwhile to offer subject searching, since the conventional wisdom of the time suggested that users seldom did subject searching, even though it could be accomplished through the card catalog.[2] This misconception about online catalogs was resolved by a massive, two-part study funded by the Council on Library Resources, *Users Look at Online Catalogs*, that appeared in 1982 and 1983 and demonstrated that subject searching was a major search mode for online catalogs.[3,4]

Many of the later enhancements, such as access by language of publication or date of publication, were controversial because they did not mirror capabilities of traditional card catalogs, and, indeed, could not be assessed within the experience of a card catalog user. Frankly, I believe that many of them became part of the system more because no one provided a compelling reason not to implement them than because they were considered a particularly exciting idea by the community at large. Most of these extensions have been at least modestly successful and invaluable for certain specialized situations, such as research in the early history of publishing.

To understand fully what is, in hindsight, a conservative functional definition of the on-

line catalog, one must recognize that the political and organizational commitment that led to the development of the MELVYL system was much more complex than a simple desire to improve access to a given library collection by developing a computer-based access tool that was more effective than the traditional card or book catalog. Certainly this was identified as a desirable goal, as were many of the other benefits that are typically attributed to online catalogs (elimination of card filing and the space taken up by the card catalog, no more worries about patrons tearing cards out of the catalog, availability of more current information to the patron, etc.). But the plan for the MELVYL system emerged out of a document authored by then assistant vice-president for Library Plans and Policies Steve Salmon, The University of California Libraries: A Plan for Development 1978–1988,[5] which looked much more broadly at the strategies for developing and funding the roughly one hundred libraries of the nine campuses of the University of California as a unified system for the first time. This plan called for initiatives such as the establishment of regional storage facilities and enhanced intercampus library materials delivery systems.

The key role of the MELVYL catalog was to provide a library user at the University of California with a coherent view of the collections held throughout the UC system as a whole, from any library within that system. This was the compelling justification for developing the MELVYL online union catalog, rather than simply suggesting that individual campuses develop online catalogs at their own pace, as their own means and priorities permitted, to improve patron access to their local collections. Local, campus-based online catalogs had great appeal because they maximized local control. One idea discussed during the initial planning of the MELVYL catalog was a distributed union catalog of nine linked campus online catalogs that would have addressed the desire for both local control and a union catalog. This idea was rejected—correctly in my assessment—as too difficult and risky, from both technical and management perspectives.

In my opinion, a union catalog built out of a set of linked local catalogs would also have been compromised by the natural desire of each campus to emphasize local needs, including requirements for technical processing, as opposed to public access; universitywide public access would have been a lower daily priority for campus library management. Thus, not only would a distributed union catalog have faced formidable technical and operational management problems, but it probably would never have obtained the necessary management focus and commitment to develop and mature. By assigning the responsibility for developing the union catalog to a separate organization (what became the Division of Library Automation at the Office of the President, the "corporate headquarters" of the nine-campus system) and limiting the scope of the MELVYL system to public access rather than including technical service support, a strong and focused development effort toward an online union catalog was ensured.

The policy commitment to employ computing and telecommunications technologies to provide unified access to the collections of the university within the context of the overall plan for developing the UC libraries as a system had obvious major benefits. We received great support both within the university and from the state legislature, which provided funding to implement the Plan for Development as a whole, including development of the union online catalog. The arguments for offering universitywide collection access were more compelling than simply the claim that converting to an online catalog would somehow make the libraries' services "better," particularly at that time and given the lack of experience with online catalogs at other institutions.

Having decided to build an online union catalog, we proposed (or more precisely, simply decided, without much debate) a rather direct and conservative approach to automation of the card catalog as most viable. It minimized controversy and technological risks, particularly given the lack of data and experience then available to support and guide a more ambitious and adventurous design. The enormous scale of the MELVYL catalog (originally planned to support about one thousand terminals and ultimately to hold at least six or seven million unique titles representing perhaps ten to fifteen million holdings), particularly compared to systems in other libraries being planned at the time, also argued strongly against a highly experimental design, either in terms of function or underlying computing technology.

It was essential that the design for the MELVYL system be understandable and achievable. Great care was taken to distinguish the MELVYL project from more visionary (and, in implementation, more illusive) projects ranging from Bush's MEMEX to Ted Nelson's visions of worldwide hypertext, and to avoid discussing it in the context of revolutions in information access. The MELVYL system was intended to be a production online union catalog, not an experimental attempt to construct the electronic library or information utility of the future. UC policy has never recognized the objective of building an electronic library; the view has been that information technology should be applied aggressively but judiciously both to expand the scope of the UC library collections and access to them within the intellectual framework of existing library missions and service objectives.

Given the historical context of the commitment to build the MELVYL catalog, it is interesting that as of 1992 the majority of the UC campuses have either developed or purchased campus-based online catalogs. There are a number of reasons for this. One is that given the critical role of the online catalog in library operations and services, there is a natural desire for campuses to want control over their own catalogs. Second, there are operational advantages available to a library from an integrated system; all of the campus catalogs are part of integrated library automation systems. In the mid-l980s, some people, including myself, hoped that developments in computer networking protocols for library automation would enable us to integrate the system by linking the MELVYL online catalog and campus systems to support cataloging, database maintenance, circulation, and other functions.[6] Progress in this area was much harder and slower than expected, and the library automation vendors resisted doing work in this area, seeing little market advantage.[7] In 1992–1993 we expect to attempt the first implementation of such a link between the MELVYL system and a campus system: A Data Research Associates (DRA) system at UC Davis will support circulation, and the MELVYL system will pull circulation status for Davis material out of the DRA system in real time for display to MELVYL users. A third factor in the development of campus catalogs was a crisis of confidence in the long-term viability of the MELVYL system. A series of policy, management, and technical problems related to the scaling up and long-term support of the MELVYL system in the mid-1980s led, I believe, several campuses to want an alternative catalog available that they could control directly.

Over time, it has become clearer that the MELVYL system and the campus catalogs fill complementary but increasingly distinct roles, and that there is great value in having one to back up the other for the limited set of services that are duplicated. As intersystem linking technology improves, the campus systems and the MELVYL system will grow even more complementary, and the growing set of options (as illustrated by the effort with UC Davis, assuming that it is successful) will offer the UC campuses expanded choices in developing strategies for campus library automation.

IMPLICATIONS OF MECHANIZING A CARD CATALOG

From the basic assumption that the MELVYL catalog would largely mirror the functions of a traditional card catalog, several design principles fell into place with little critical examination.

The Patron Would Go to the Library to Use the System

This principle pervaded all aspects of the system. Terminal installations were planned for the libraries, with some discussion of the desirability of eventually locating a few terminals in other key locations such as dormitory lobbies. The user would go to a MELVYL terminal in the library (or, a faculty member, fortunate enough to own a terminal, could dial up the system using a modem) and perform searches, locate material, and then go to the library to use or borrow it.

This view of the world, which now seems charmingly antiquated, makes sense when one realizes that in 1980 personal computers did not exist, and local and wide area networks were essentially experimental curiosities used by the computer science research community. Today, we view online catalogs in the context of a richly networked distributed computing environment where we increasingly assume that all users have ready access to the network and have considerable desktop computing power. In this environment, it makes sense to consider electronic links to document deliv-

ery service, electronic delivery of documents (remember that low-cost, high-quality laser printers, now ubiquitous, also did not exist in 1980), and various forms of system-initiated current awareness services. In an environment in which the majority of the user community had access to the system only by going to the library, such services were impractical and did not make sense within the existing information technology infrastructure.[8]

(A careful look at the history of the MELVYL system's evolution might indicate a broader commitment to remote access on the part of the system developers than was politically admissible at the time. We did not really believe that patrons would always have to visit the library to use the online catalog. We designed for a lowest common denominator terminal to make the system usable from many locations. We moved far more aggressively than most online catalog projects in trying to make the MELVYL catalog accessible through campus networks, national networks, and even campus port selectors as opportunities arose during the 1980s. However, it is only now, in the 1990s, that we are seriously working to provide facilities such as the ability to send search results through electronic mail, electronic mail-based current-awareness services, and electronic links to campus document delivery services, as well as seriously planning for network-based document delivery. We were not always forthright about the extremely high priority we gave to network accessibility of the catalog, and in the early years of the development of the MELVYL system we probably devoted more effort and resources to this goal than the policy-makers would have been comfortable with had we showcased the effort.)

In summary, this original design principle was realistic when it was adopted but eventually became totally wrong as the information technology infrastructure at UC developed. Fortunately, we were cautious about taking it too seriously, and fairly quick to abandon the plan as its focus became outdated.

The User Would Always Remain in Full Control and Be Fully Aware of the System's Function

There was considerable and well-justified concern about designing a system that would try to do too much for the user and that, in the end, would either fail to deliver desired results, particularly to users who knew what they were doing, or would deliver results that were not comprehensible to users, particularly to the great majority of users who lacked—and did not desire—intimate knowledge of the system's inner workings. Too many people, in 1980, had seen the results of inept system design, particularly in contexts where computer scientists or information retrieval researchers had built prototype library automation systems that were either unusable, incomprehensible, or both. The experimental IR systems of the 1970s, such as Salton's SMART system, which used complex automatic indexing and query evaluation methods, were superb examples. Mike Berger accurately characterizes this type of IR system, from the user's perspective, as magic. There was a strong consensus that the patron must understand what the system was doing and remain in control of interactions with it. There was, perhaps, a bit of wishful thinking embodied in this principle. Few users of either traditional card catalogs or online catalogs really "know what they are doing" (except trained librarians). Results of a subject search against a large database cataloged with Library of Congress subject headings are certainly neither obvious nor intuitive to most library users, I believe, and studies of the difficulties of subject searching seem to support this contention.

These considerations led to the design of a system with two modes. One was a rather simple menu mode, called Lookup mode. As the system developed, the Lookup mode was kept simple and was an increasingly limited subset of the overall capabilities of the MELVYL system. It was not even implemented for the A & I databases when they became part of the MELVYL system. Lookup mode was probably a necessary evil given that in 1981 the MELVYL system was the first interaction that many patrons had with computers, and they seemed more comfortable with a menu-based approach. As computer literacy has increased, users seem more and more willing to use command languages, and as of late 1992 Lookup mode is being discontinued.

The other MELVYL interface mode is a command language. This is a reasonably simple structured command language with full Boolean capabilities that supports queries such as FIND SUBJECT INFORMATION

RETRIEVAL AND TITLE AUTOMATIC with the usual abilities to abbreviate words. Natural language approaches were rejected because we did not feel we could interpret natural language queries in an unambiguous and comprehensible fashion.

Performance issues, combined with the growing problem of users confronted with very large retrieval results as the database grew, led to increased precision in query processing. Keyword searching in titles and subjects was supplemented with exact searching (left anchored with optional truncation). In the early days, subject keyword searches actually searched both subject and title fields of bibliographic records in an attempt to help users with cataloging vocabulary problems. This process was abandoned because of the extra cost it added to the subject searches, because the results were hard for the user to understand, and because it led to even larger result sets. A number of other indexing and access decisions were similarly revisited.

When periodicals were added to the database, they were placed in a separate file, both to help precision and to help system performance. Similarly, when A & I databases were mounted they became a series of separate files, both for reasons of precision and comprehensibility, and because the A & I vendors insisted that the identity of their files be preserved. From the perspective of someone who understands the library, all of these choices do help keep the user in control and the system's behavior comprehensible.

The MELVYL system today, viewed with some detachment, requires modest user library literacy. To really exploit the system, the user needs to understand the difference between titles and subjects, personal and corporate authors, books and periodicals, and periodicals and articles within these periodicals. These concepts seem basic enough to those of us who are seriously involved with libraries; but there is evidence that such knowledge is hardly universal, even within a major research environment like the University of California.

There were other implications of this design principle of total user control and awareness. The original design did not enable the catalog to make assumptions about what the user wanted or intended when issuing commands. It avoided heuristics, spelling correction, or making suggestions that might be helpful in many, but not all, cases. In general, the system simply received orders from the user; it did not try to be overly "helpful." As the system matured, the position on this softened somewhat, largely in response to extensive analysis of transaction logs and other user studies. A few heuristics were introduced, very carefully, and with much controversy. In some cases, librarians at the campuses remained sufficiently distrustful of these heuristics that in bibliographic instruction they trained users to avoid triggering them.[9] However, I believe that these heuristics are helpful, particularly to users who access the system occasionally and casually across the network and are unlikely ever to bother learning how to use the system more effectively.

One corollary of this assumption has been the ambiguous attitude toward instruction in using the catalog. We want a system that can be used without instruction but that repays an investment in learning (through formal instruction, reading the manual, reading the help screens, or, in the future, spending time in a tutorial mode in the user interface) by providing more powerful, precise, and effective facilities. In some sense, these two goals are conflicting, and balancing them is difficult. The staff at the UC libraries has done a superb job of developing bibliographic instruction to support the use of the MELVYL system, and library patrons who invest in such instruction benefit substantially. At the same time, however, there is a natural tendency to focus on the relatively sophisticated and serious user, perhaps sometimes to the detriment of a user who might feel well served by a more heuristic, actively helpful catalog. The counter-argument is that by implementing such features, we are permitting the naive user to shortchange him or herself, and that the system should not allow that user to go away remaining ignorant and satisfied. Realistically, there is a certain percentage of users who are fairly determined to remain ignorant or who use the system too infrequently to bother learning much about it. Thus it seems we may as well make them happy too. The proper balance between these positions is controversial.

I believe that this design decision was both right and wrong; it was right in the sense that online catalogs must be able to present a user interface that meets these criteria fully. But I believe it is best viewed as a requirement, and not a limitation on other functions that may

be offered by the system, particularly as the online catalog becomes a much larger, richer, and more complex information access system. Later sections of this paper will return to this issue.

I think it is also important here to separate the design objective from the system's technical limitations. Supporting very large bibliographic databases is still a major performance problem, which is why the system segments databases such as MEDLINE® into a series of backfiles. It is a major reason why the MELVYL system has not merged monographic and periodical records into a common database. As we design future systems, however, we should not use the design objectives of precision, user control, and comprehensibility to justify the need to recognize technical limitations in the system design. We should recognize technical limitations for what they are. Good response time is a very important design objective, and it seems likely that we will continue to subordinate a number of other objectives in the name of response time.

The Catalog Should Not Provide an Evaluative Viewof the Collection

Early in the design of the system, the conclusion was reached that results would be presented in standard main entry order. It is unclear to me just how this was decided, but even today it is a basic assumption. There was some discussion about adding options in the future to permit users to alter the arrangement of result sets (for example, to ask for a display by publication date), but this function has never been implemented due to technical problems and the cost of required computing resources. It is important to recognize that, as with many issues involved in the design of the catalog, the selection of the default function, service, or option is really the critical choice. Relatively few users know how to override the defaults or choose to do so. Most of these users are fairly sophisticated, for whom the choice of default is relatively unimportant, because they understand that there is a default, what the default is, what other options are available, and they can make a choice. We chose to default to presenting all publication dates and languages, and all works, on an equal basis.

Part of this decision was based on the earlier requirement that the operation of the catalog be entirely comprehensible to the user. This principle argued strongly against various heuristic or probabilistic ranking approaches that might have been applied, either based on the estimated closeness of match between the user's query and the citations in the result set, or by making assumptions about the overall nature of material that would be of interest to the user (e.g., English language and recent publication date for at least a large number—perhaps the majority—of users, and particularly of relatively unsophisticated users). Assumptions about the nature of material of interest to the user also raised questions in the context of the growing sensitivity to cultural diversity issues within UC.

Experience over the past decade has indicated that one of the greatest problems users face is managing the size of retrieved result sets. Searches with zero results are quite common and occur for many reasons (typos, spelling, problems with the subject vocabularies used in cataloging material). The sort of heuristics discussed above help resolve these situations. But even more serious are the more and more frequent large result sets containing hundreds or even thousands of records. Users desperately need help in navigating through these huge results and in reducing their size. In fact, users want much more than assistance in ranking based on known or assumed user preferences and closeness of match to the user's query. They want help from the system in finding "a few good references on . . ." rather than everything written on the topic. This is anathema to the principle of nonevalulation that has guided the development of the MELVYL system. It is also a very complex need to address, since the information available to evaluate material in traditional cataloging records is limited. To meet this need, bibliographies, book reviews, pathfinders, review articles, citation indexes, statistical impact factors, databases defining core literature in various disciplines, and other resources must be integrated with the catalog to produce a complex knowledge base that goes far beyond the contents of existing traditional bibliographic databases. This is not simply a problem in the design of online catalogs; yet I believe it is one of the most critical needs to be addressed in the academic information access systems of the 1990s and beyond.

The User Will Be Anonymous

Users of card catalogs are anonymous. Of course, the card catalog is a totally passive device; it has no memory of its use. So while a library might physically control access to its catalog, there is no need to keep track of who is using it because there is absolutely no benefit to be gained from such tracking. In the design of the MELVYL system users are anonymous. There was no reason to do otherwise; but another part of the consideration was the enormous administrative burden of issuing accounts on the catalog, either through a direct registration process or by building on the registration processes already in place at the campus libraries. Later in the development of the system, as licensed A & I databases were mounted that are restricted to the UC community, facilities were added that allow us to determine if a user is a member of the UC community without having to identify individual users.

From a policy perspective, I believe that users deserve the reasonable expectation of privacy in their use of the catalog in the same sense that they reasonably expect their circulation records to be confidential. If they use the system other than anonymously, they should expect that their searches remain confidential. Certainly, anonymity is an excellent guarantee of confidentiality. But from the point of view of designing an effective information retrieval system, anonymity of users is a great constraint. It precludes viewing user-system interaction from any perspective broader than a single session. The system cannot remember the user's preferences (for example, the user does not read anything but English and French), cannot tell the user about news of interest, cannot support current awareness, cannot remember that the user has not used the system in six months and might like a few reminders or that the user has used the system twice a day for the last year and is familiar with its features. I believe that part of the future evolution of the MELVYL system and other online catalogs will be to include features that are sufficiently valuable that the user will often be prepared to trade the near-absolute guarantee of confidentiality offered by truly anonymous access for non-anonymous access with trust in policies promising confidentiality. Further, there are several design alternatives that could allow the system to remember information about users from one session to another without the need to identify them, such as self-registry with a nickname. These features limit function in that if the system is to interact dynamically with a user's workstation on the network it must know the identity of that workstation, thus compromising anonymity; but they do allow the system to remember user preferences and activity profiles, thus allowing some improvements.

Further, it is possible to develop an infrastructure of trusted "brokers" that can serve as intermediaries to conceal the identity of client workstations in a network environment, if necessary. Such arrangements are already being developed for electronic mail "personals." I feel that future systems should support anonymous access up to the limits required by license agreements. For the casual—or very paranoid—user, this is useful. Any type of registry is a barrier to access for the casual user. But I believe that basing the system on the assumption that the time horizon for user-system interaction is a single search session, we have disastrously limited our ability to build effective information services.

NEW FUNCTIONAL CONSIDERATIONS FOR THE 1990s

Since the deployment of the MELVYL catalog in 1981, two major considerations have emerged that were not addressed in the initial design. Both of these are products of changing technology. The first was the expansion of the system from a simple online catalog to a collection of information resources that included A & I databases, such as MEDLINE and CURRENT CONTENTS®, and gateway access to other online catalogs, A & I and full-text databases mounted on other systems accessible through the network, and specialized resources such as scientific databanks and weather information. The inclusion of such databases was a massive, but in many ways straightforward, extension of the original design of the MELVYL catalog. The command language was extended and generalized, but a user, having learned to use one database, generally has little difficulty transferring knowledge to others. (Some of the databases, such as MEDLINE, have extensive, unique, specialized features; but they are typically functions of the information in the database, not of the user interface.) It was really not until the mid-1980s that the decreased cost of com-

puting cycles and disk storage made implementation of such huge databases feasible, and only continued reductions in these costs have allowed us to mount large numbers of them for intensive use by the UC community. The MELVYL system currently services 500,000 queries a week during busy times of the year. The computing resources to support this would have been out of reach a few years ago.

While the mechanics of using a given database are less and less of a problem, the multiplicity of choices is becoming confusing and overwhelming.[10] It is not always clear to most users when it is appropriate to use a given database or to choose one over another. Further, the fragmentation of information into a large number of databases (typically licensed from commercial A & I services), each with different and idiosyncratic data elements, varying chronological coverage, varying completeness of coverage, and overlapping with other databases in complex, difficult-to-define ways, is immensely troublesome for most information seekers. Other database-specific attributes add to the confusion: full text (for some or all material in the database), images, abstracts, data quality, and timeliness. The number of resources continues to multiply, and the systems of the 1990s will have to help users select appropriate resources for various information needs and effectively combine results from multiple databases. Here again I suspect that the ability to remember the user's preferences and past experience with the system will be crucial. One can, for example, imagine a system that conducts a partial reference interview with a new user and then uses that data to guide the user among available information resources. In the past, such approaches have been impractical because the user would not be willing to invest time in a lengthy background dialogue with the system at every new session.

Just as with the issue of evaluative retrieval and ranking from bibliographic databases discussed earlier, the problem of selection of appropriate resources is not simply solved by adding functionality to a retrieval system. New descriptive directory databases will have to be developed to support these new navigation and selection functions, and the appropriate data elements and descriptive approaches needed to create the information base to support these new functions is still very much a subject of active research.[11] Further, effective user guidance in selection among resources is again an evaluative function.

The second novel design issue concerns the relationship between the information access system and the overall distributed computing and workstation environment that is currently evolving at major academic institutions. One aspect is the development of user interfaces that effectively exploit bitmapped display devices (perhaps with color and sound capabilities), which are rapidly replacing the older, character-oriented terminals for which the current MELVYL system is designed. I do not regard this change as simply the development of graphical interfaces with windows, icons, and a mouse or other pointing device. I believe that harnessing the potential of bitmapped displays to provide effective and intuitive user interfaces to information retrieval systems will be a much more complex and subtle undertaking and will require extensive research, prototyping, and evaluation in the next few years.

Character terminals will persist for at least another ten years alongside the bitmapped displays. We also must consider how to maintain sufficient consistency between the character and bitmapped interfaces so a user can easily make the transition from one to the other, or even use one at home and the other in the office. Driving a bitmapped display will require considerable bandwidth, and a user with a workstation at home may prefer to emulate a character-mode terminal if constrained by a slow dial-up phone line.

There are also software architecture questions to be answered. It is clear that we are moving into a client-server environment, perhaps with multiple levels of clients and servers. But the distribution of function remains unclear. Where will software reside to perform various functions (searching, display, integration of information from multiple sources)—on the central institutional system or the user's workstation? What organization will write, maintain, and support this software? Will the institution or commercial vendors provide software that is installed and supported on each end-user workstation within the institution, and undertake all of the software management and maintenance issues that arise in such a large, poorly controlled, heterogeneous environment? Will workstation vendors provide it as part of the base system, or will library automation

suppliers or third-party software suppliers outside the library automation tradition supply this software? Or will the model for the next generation of software be a desktop device working as a graphical display, driven from centrally administered institutional systems (either purchased or locally developed) using protocols such as the X-Window system? (In this last scenario, these institutional "user interface servers" offering X services to end user clients might themselves function as Z39.50 clients to institutional or national information servers on the network.)

A closely related question is the degree of centralization of access to information resources. Will the end user directly access a multiplicity of resources from his or her workstation (and even, in many cases, pay the costs of using them, and negotiate license agreements, in which case software on the workstation will have to support mediating and integrating functions)? Or will most access to information resources be institutionally funded and mediated through institutional systems? A full exploration of these issues in the context of the changing library and the developing world of networked information goes far beyond the scope of this paper[12], but it is important to recognize the implications of these policy issues for the architecture of future systems.

It is also important to recognize the immaturity, both in conceptualization and technology, of the distributed computing environment as a context for information access systems. This may be at about the same point as network access to online catalogs was in 1980. We know it is important, but the details are not clear yet. The long-term implications, both technical and organizational, are unknown, and developers of production systems can only track the evolving environment closely and be prepared to continue to adapt the system to its requirements aggressively.

CONCLUSIONS

The evolutionary descendants of the MELVYL system (and other systems of its generation) will differ in many ways from today's online catalogs. Certainly, there will be changes which exploit better delivery technologies for the user interface, such as bitmapped display devices. But, in a more profound way, I think that they will not be designed as mechanizations of the old card catalogs, but as new information access and delivery platforms which operate on databases that are much richer and more complex than today's bibliographic and A & I databases, and that are built by combining and integrating information from multiple sources. Not only will the user interface and searching algorithms change, but the contents and scope of the information bases to which the system provides access will change also. These future systems will be more heuristic, and will evaluate information and guide the naive user, while still permitting the "expert" user total and direct control. They will be more generous in their expenditure of computing resources to help the user. For example, systems that perform multiple parallel searches on multiple databases and only mention the most promising few databases as sources for further investigation to the patron will become commonplace. Systems will optimize response time to the user and effectiveness of results rather than consumption of computing resources.

Tomorrow's systems will be more diverse than today's, presenting a greater range of different personalities adapted for different classes of users. They will provide help not only in using information sources, but in selecting them. Part of this future will come by way of a more integrated view of multiple databases, and part just by reorienting the user interface to recognize that the searching process also implies a selection of sources to search. It is interesting to note, in this connection, that recently developed systems designed for the networked information environment such as WAIS incorporate this selection of sources as an integral part of the standard user-system interaction.

These next-generation systems will support not only "active" searching, in which the user connects to the system to find information, but also a wide range of current awareness services, in which the user simply connects and is told what is new that might be of interest, or in which the system even contacts the user (or the user's workstation) through electronic mail or other mechanisms when something new and particularly interesting to that user enters one of the system's databases. Clearly, such systems must support non-anonymous access and make extensive use of long-time horizon user-system history to customize interactions through information gathered about users' preferences and past history.

We will not simply modernize the catalog in the new generation of systems; we will conceptualize and create a new class of information systems that include, as a part of their function, the traditional functions offered by card catalogs and automated card catalogs. One challenge will be coming up with an appropriate name for this new generation of information access and retrieval systems that reflects the extent to which they go beyond the traditional automated catalog both in scope of contents and in functionality. It is time to stop calling them online catalogs—the term itself is unduly limiting as we come to reconceptualize them.

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8. Current awareness services were familiar to users of systems like Dialogue in the 1970s, but these people were typically professional search intermediaries. In 1980, most patrons did not use a computer often enough for current awareness to be successful as an end-user service.
9. Clifford A. Lynch, "The Use of Heuristics in User Interface for Online Information Retrieval Systems," speech delivered at the ASIS annual meeting, 1987.
10. This applies to those database choices accessible through the MELVYL user interface, as opposed to through a remote terminal session gatewayed through the MELVYL system. When accessing a remote system, the user must use the native user interface of the remote resource, which can still be a problem. There are a number of unfriendly systems on the network, and some have a substantial learning curve. Some are radically different than the MELVYL system and confusing to MELVYL users because the user's existing experience with the MELVYL system is a treacherous guide and does not extend well. Also, network terminal emulation protocols add further complications. New technologies such as the Z39.50 computer-to-computer information retrieval protocol promise to permit access to ever larger numbers of remote information resources through a user's familiar local interface. This will further emphasize the problem of resource selection rather than access mechanics.
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The MELVYL System in the Larger Context of the University of California's Information Technology Planning

Richard West

The MELVYL information system is an important component of the University of California's (UC) strategy to transfer from print to networked information. This paper traces the development of UC's library automation strategy over the past five years and the role of the MELVYL system within this strategy. This paper will highlight the need for systems, such as the MELVYL catalog, to function within an overall institutional strategy and the issues raised by such coordination efforts.[1] The evolution of the MELVYL system into a manageable production operation, and the development of an institutional library automation policy framework within which the MELVYL system could succeed, may be of interest to other information technology planners and managers in educational institutions charged with developing institutional initiatives in this vital area of information technology.

ORIGINS OF THE MELVYL SYSTEM: A POLICY PERSPECTIVE

The MELVYL catalog had its origins in the 1977 *Plan for Development* for the University of California library system.[2] Although the plan called for the development of a specific automated system to provide a unified view of the library collections maintained by University of California's nine campuses, which became the MELVYL catalog, the 1977 plan did not articulate an institutional library automation strategy. At this time, there was little coordination between the planning for a UC information technology infrastructure (both networking and computing) and library automation initiatives. In the late 1970s, library automation was still viewed as an in-library activity largely unrelated to broader universitywide information technology planning. This perspective preceded the age of ubiquitous networking.

The lack of coordination between the MELVYL system and other universitywide computing and networking activities was acute by the mid-1980s. The MELVYL system operated from a computer center separate from other universitywide computing applications. As the first large-scale networked universitywide computing application, a universitywide computer network to support the MELVYL catalog had been developed in the early 1980s. By mid-decade, other multicampus applications were being deployed that also required computer networking support. Between the years 1980 and 1986 there was extensive planning for and subsequent implementation of an information technology infrastructure within UC. These networking efforts were not merged with those of the MELVYL system into an overall universitywide telecommunications system, however. In 1980, the work on the MELVYL system could proceed in isolation, as there were few projects under way on that scale. By 1986, however, a great deal of progress had been made on other fronts, and the lack of connection between MELVYL work and other universitywide efforts had become a major liability.

Because the 1977 *Plan for Development* did not include a comprehensive plan that contemplated library automation requirements at the campus level, and because there was no subsequent funding strategy to address campus library automation needs, there was a natural tendency to assume the MELVYL system was the unarticulated strategy for universitywide library automation. The MELVYL system was not a strategy to meet campus needs, however, and was never intended to serve this role. Not surprisingly, the campuses were extremely unhappy with what they viewed as a failure to support local campus library automation requirements. Their needs had not been addressed due to a failure in the definition of roles and responsibilities, and there was no specific, programmatic funding for campus-based automation.

By the mid-1980s, the MELVYL system itself faced terrific problems. It had outgrown the computer center that had been designed to house it, both in terms of physical space and computing resources. The resulting resource management approach of minimizing hardware and software investments was inconsis-

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tent with the needs of a production system destined to be the cornerstone for public-access information retrieval services within the university. To cite one specific example, by the mid-1980s, there was no more disk space available to house the MELVYL database and no more floor space to install additional disks. This situation led to a crisis of confidence among the UC campuses that had been relying on the MELVYL system as their primary catalog, and ultimately many of these campuses developed or acquired local integrated systems to meet local operational needs.

Perhaps as a reflection of the pressures of extremely constrained resources, the MELVYL development group had diverted a substantial effort toward a variety of research projects in areas such as packet radio. While these were unquestionably interesting areas, they were not central to the mission of the organization and were representative of a loss of focus. These activities were inconsistent with the appropriate role of an organization that provides basic production services to the faculty, staff, and students of an educational community. It can be argued that the early history of the MELVYL system is a case study of how and why innovative technology initiatives within large, dynamic organizations first succeed and then ultimately fail by taking on a life of their own and then growing disconnected from ongoing changes in the environment that spawned the initiative.

THE INSTITUTIONALIZATION OF THE MELVYL SYSTEM

In 1986, the following actions affecting the MELVYL system were taken:

1. The MELVYL system computer center was merged with the administrative services computer center in the Office of the President. This consolidation permitted an upgrade of the technology base that supported the MELVYL system and achieved desperately needed economies of scale that offered the MELVYL system sufficient computing resources to meet user demand.

As part of the consolidation process, the MELVYL system environment was upgraded to IBM's state-of-the-art MVS software environment and ever since has maintained pace with current systems developments. Vast amounts of complex, custom code developed for the old technical environment has been eliminated, leading to a far simpler, more manageable, and more maintainable system. There was an explicit recognition in this transition of a change from a 1960s mentality of squeezing every cycle out of hardware to a 1990s perspective emphasizing maintenance and resource flexibility at the expense of modest software overhead. This new approach allows the MELVYL system to take advantage of continued vendor improvements in hardware and operating system environments.

2. The MELVYL network was merged with the developing universitywide Intercampus Telecommunications Network (ITN). Again, this consolidation led to massive economies of scale. The MELVYL network had been based on a mix of leased 56Kbit/second common carrier circuits and circuits obtained for a private satellite network. The ITN is based on T1 multiplexer technology and offers circuits derived from T1 spans that aggregate demand. By converting most of the circuits used in the MELVYL network to derived trunks on the ITN, great cost savings were achieved with modest reductions in reliability.

3. Planning and policy development were initiated to address the MELVYL system's role in the universitywide information technology and communications planning. The initiatives also defined campus roles and responsibilities for library automation as well as the overall conceptual framework in which campus-based library automation systems and the MELVYL system would serve as complements rather than competitors.

This work provided a foundation for the broader planning initiatives described later in this paper.

4. Management control and reporting procedures consistent with a large-scale production information system were emphasized, such as usage and uptime statistics for the MELVYL catalog. Response time and system reliability were given new emphasis as major organizational objectives. This change in focus provided a strengthened foundation for measuring organizational performance and ongoing capacity planning. In addition, a structured, formal planning process to guide future system evolution was initiated.

5. Periodic individual campus visits with library automation staff and campus library

and campus technology staff were initiated. These meetings reemphasize the campuswide coordination required to have the campus network tied to local and universitywide information resources. These forums have also been instrumental in identifying cooperative development activities between the campus and central library automation groups.

The MELVYL system has stabilized and a growth path for future system development established. Indeed, use of the system has expanded fourfold since 1986. Campus confidence has been regained, and efforts to harmonize MELVYL development with campus library automation and information technology initiatives are at work. In addition, the MELVYL system itself has entered a period of new growth, with substantial expansion of functionality and the addition of a number of new databases—including CURRENT CONTENTS®, Expanded Academic Index, National Newspaper Index, a ten-year subset of the main bibliographic database—and access to a number of externally mounted networked information resources such as ERIC and GeoRef (through cooperative agreements with Stanford University), LEGI-SLATE, and the Hispanic-American Literature Index. Additional databases, beginning with INSPEC, are scheduled to be mounted in the coming year.

POLICY DEVELOPMENT FOR NETWORKED INFORMATION RESOURCES

In recent years, the university has been able to focus attention on basic planning issues. The acquisition of costly electronic information resources (centrally mounted abstracting and indexing databases and source material, CD-ROMs at the campus level, and externally licensed information services) must be planned. Funding and policy statements are needed to allow resources mounted at one campus to be shared with other campuses. There were many technical and policy questions to be answered, such as relating library services to the evolving electronic network service infrastructure of authentication, recharge, printing, workstation access, and national networked information resources.

Like other institutions, UC is still seeking answers in many of these areas. But I am confident that we are addressing the really important questions at many levels. At a national level, UC has been deeply involved in efforts such as the ARL/CAUSE/EDUCOM Coalition for Networked Information. UC also contributes to the activities of all three of the parent organizations, as well as other related groups such as the National Information Standards Organization (NISO) and the Internet Engineering Task Force (IETF). At a universitywide level, we are exploring various issues through an extensive series of prototype and development projects. One such project examines the Z39.50 computer-to-computer information retrieval protocol, which is viewed as a key to providing as much commonality of user interface to networked information resources as possible. The Elsevier Tulip Project begins to explore site license and electronic distribution issues for scholarly journals. As well, there are efforts to mount full text for journal articles, develop links between the MELVYL system and campus document delivery systems, and, indeed, expand the MELVYL system from a simple online catalog to a multifaceted information resource that both offers a wide range of locally mounted databases and serves as an access gateway to an even wider range of other networked information resources. We also have set in place an extensive, universitywide consultative and policy development process, which is an unprecedented coming together of librarians, information technologists, administrators, faculty, and networking specialists to define issues and formulate UC policy as electronic information and networked services become widely available. Indeed, we are actively exploring many of the opportunities offered by information technology—including electronic information resources and network-enabled services such as Electronic Data Interchange (EDI)—with university business partners as part of a broader effort toward organizational process reengineering. These efforts look beyond library automation, but libraries play an important role, nevertheless.

Great progress has been made toward harmonizing specific initiatives, such as the evolution of the MELVYL system, with overall university goals. Broadly based policies and strategic plans have been developed to accomplish this coordination. The MELVYL

system is vital to the University of California's strategic approach but is now viewed as an instrument and an engine of the ongoing transition to electronic information and network-based information services, rather than an end in itself. This perspective and management orientation has been essential in guiding the MELVYL system through adolescence and into maturity, and in allowing the system to realize its full potential as a vital service to the university's faculty, staff, and students.

REFERENCES AND NOTES

1. In the University of California context, the term *institutional* refers to all nine campuses and three DoE laboratories managed by UC. Similarly, the term *universitywide* is used to distinguish institutional efforts from campus-based efforts.
2. The University of California, Office of the Executive Director of Universitywide Library Planning, *The University of California Libraries: A Plan for Development 1978–1988* (Berkeley, Calif.: The Univ. of California; 1977). ■■

Tutorial

Implementing TCP/IP Communications with HyperCard

Eric Lease Morgan

This article describes how to implement TCP/IP communications with HyperCard in three steps. First, it briefly examines the tools used to access information resources available through the Internet. Second, it outlines the necessary hardware and software requirements to make TCP/IP communications possible on a Macintosh. Third, it illustrates the implementation process with two stacks—Mini-Atlas and ListManager.

THE INTERNET

Transmission Control Protocol/Internet Protocol (TCP/IP) is the name given the set of communications standards that make possible the vast network of computers known as the Internet. With these standards one can use telnet to log into remote computers, transfer files from remote sites with file transfer protocol (FTP), and send electronic mail to remote computers. If a Macintosh computer is directly connected to the Internet, then the user probably runs communications programs like BYU/NCSA Telnet and TN3270, XferIt, or an electronic mail gateway to remote computers. These programs are general-purpose tools for remote access; they are not intended to provide access to specific information services. With HyperCard it is possible to create specialized information-gathering tools to access specialized information services.

REQUIREMENTS

The hardware and software required to implement TCP/IP communications from within HyperCard include a Macintosh with a direct connection to the Internet, any version of HyperCard, MacTCP, and the XCMDs from the HyperCard TCP Toolkit. Of these components, the most difficult to acquire is the direct connection to the Internet. (Users should contact their systems administrator for further information on a direct connection.) HyperCard comes with every Macintosh. MacTCP is an operating system extension enabling the Macintosh to implement the TCP/IP protocols. It is available from the Apple Developers Association (APDA) (1-800-282-2732).

Finally, the HyperCard TCP Toolkit is a set of XCMDs that calls the routines within MacTCP. XCMDs are compiled portions of programming code, usually written in the C or Pascal programming language, that can be added to HyperCard stacks, adding additional functionality to the HyperCard HyperTalk language. The TCP Toolkit is available from APDA, America Online, and a number of anonymous FTP sites.[1] The following descriptive text was taken from the introductory card of the HyperCard TCP Toolkit.

> The HyperCard TCP Toolkit consists of a set of HyperTalk commands and functions which allow HyperCard stacks to establish TCP connections and send data across them. There is also a function for performing name-to-address translation.
>
> A connection is established using the TCPActiveOpen function, which establishes a connection with the remote socket (a connection between computer processors allowing them to communicate in a fast, reliable manner) and returns a connection ID. This connection ID is used to specify which connection to send and receive data on for the TCPCharsAvailable, TCPSend, TCPRecvChars, TCPRecvUpTo, and TCPRecvMsg commands and functions. The TCPState function returns the current state of the connection. To gracefully close a connection, the TCPClose command is called; the HyperTalk script should then wait for the connection to close, by calling TCPStatus until it returns "closed," and then calling TCPRelease. (A call to TCPRelease, without first closing the connection, will abort the connection.)

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Alternatively, TCPPassiveOpen will allow a connection to be accepted on a particular socket. The TCPState function can then be called to determine when the connection is established.

BASIC ALGORITHM

The following is a simple algorithm for establishing a connection, performing a dialogue with the remote computer, and closing a connection.

1. Resolve the remote computer's name or address with TCPNameToAddr.
2. Open a connection to the remote computer with TCPActiveOpen.
3. Make sure a connection is established with TCPState.
4. Read incoming characters with TCPRecvUpTo.
5. Send outgoing characters with TCPSend.
6. If the dialogue is not complete, then go to step 3.
7. Close the connection with TCPClose.
8. Release the connection with TCPRelease.

Using this simple algorithm with MacTCP, two information-gathering tools have been developed: Mini-Atlas and ListManager.

MINI-ATLAS

Mini-Atlas is a client for the Geographic Name Server. The Geographic Name Server contains brief information about most United States cities and geographic landmarks. This sort of information usually includes the name of the place, the type of place (city, river, lake, mountain, etc.), the latitude and longitude, a remark, the county it is located in, the telephone area code, the zip codes, and the 1980 census population.

To query the Geographic Name Server manually it is necessary to follow these steps:

1. Open a TCP/IP connection to martini.eecs.umich.edu on port 3000.
2. Wait for the period (.) prompt.
3. Send a query in the form of a postal-like address; for example, Lancaster PA, Lake Erie, or Los Angeles.
4. Wait for the period prompt.
5. Logoff.

Notice the similarities between manually querying the Geographic Name Server and the basic query algorithm listed in the section above. Querying the Geographic Name Server for "lancaster, pa" yields the following output during the Mini-Atlas session:

```
# Geographic Name Server, Copyright 1989,
    1990 Merit Inc.
# All rights reserved.
# >>> NEW VERSION!!! <<< Use "help" or "?"
    for details.
.
lancaster, pa
0 Lancaster
1 42071 Lancaster
2 PA Pennsylvania
3 US United States
R county seat
F 45 Populated place
L 40 02 16 N  76 18 21 W
P 54725
E 357
Z 17600
Z 17601
Z 17602
Z 17603
Z 17604
Z 17605
.
bye
```

The HyperCard script in Mini-Atlas automates the above manual communications and query processes so that by answering one simple question the user can retrieve data from the Geographic Name Server without having to initiate the communications procedures manually. All the necessary HyperTalk code for Mini-Atlas is listed in appendix A. What follows are descriptions of essential parts of the code.

First, the Geographic Name Server's IP name is resolved (step 1 of the basic algorithm).[2]

```
put item 1 of TCPNameToAddr("martini.
    eecs.umich.edu",,) into the IPAddress
```

If an error did not occur, then a connection is opened with theIPAddress on port 3000 (step 2).[3]

```
put TCPActiveOpen(theIPAddress, 3000, 0)
    into connectionID
```

Again, if no error occurred, then wait for the period prompt with a handler called WaitForPeriod. This function waits for a linefeed character (ASCII character 10) and returns the character and the string preceding it (steps 3 and 4).

```
put TCPRecvUpTo(connectionID, linefeed, 60,
    empty) into theResponse
```

Once the Response is retrieved, the program determines whether or not it is the period prompt. If it is the period prompt, then the query is retrieved from the user's input and sent with the SendLine handler. SendLine verifies the connection and sends theText (in this case, the query) (step 5).

```
if TCPState (connectionID) is "established"
    then
  TCPSend connectionID, theText & return &
    linefeed
end if
```

After sending the query, WaitForPeriod is called again. Not only does this handler wait for the period prompt, it also puts all incoming text into a field for later analysis. After the period prompt is sent from the server, the connection is closed and released with the Disconnect handler where it calls the following two commands (steps 7 and 8; see figure 1).

```
TCPClose connectionID
TCPRelease connectionID
```

The most difficult aspect of developing this information tool is creating a way to analyze the retrieved data. Mini-Atlas parses the retrieved data into records and creates new cards for each record. Each card contains four buttons and one field. The field contains the text of the retrieved data (see figure 2). Three of the buttons are used for navigation. The last button reads the place's latitude and longitude, converts them into screen coordinates, and literally pinpoints the place on a world map (see figure 3).

Other things could be done with the data. For example, many place names could be entered and the distances between them calculated. Populations could be compared. The Mini-Atlas could be used to answer many simple reference questions about a place.

LISTMANAGER

Another, more interesting application is the ListManager, a front end to LISTSERV programs operating electronic lists such as PACS-L, AUTOCAT, and LIBREF-L. ListManager automates the procedures necessary to search the archives of these lists by keyword Boolean queries, turn off mail from the list temporarily, retrieve a list of the list's participants, or retrieve files from the lists. With the ListManager, the user can do all this and more

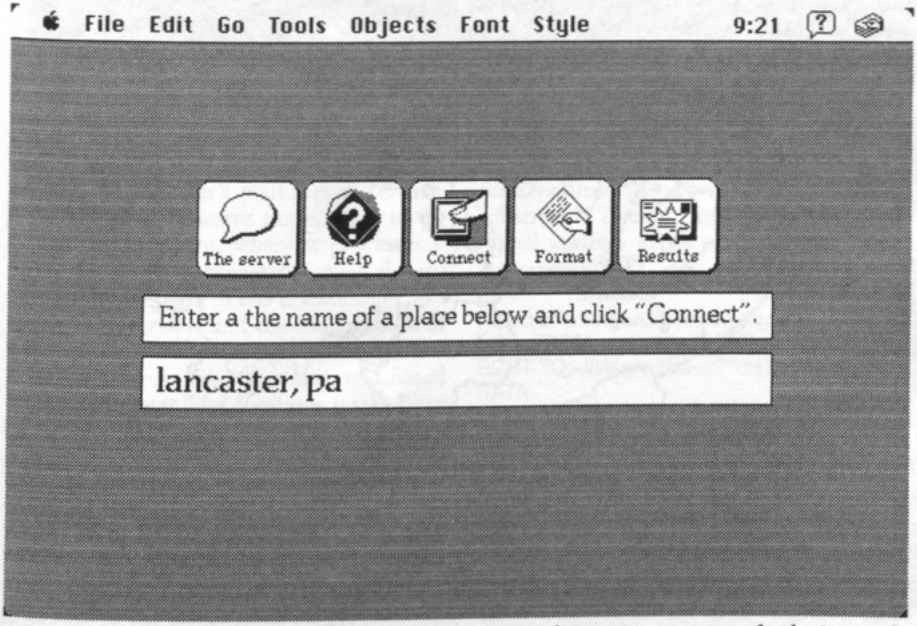

Figure 1. The opening screen of the Mini-Atlas simply requires the user to enter a query for the Geographic Name Server. After clicking the "Connect" button the Mini-Atlas opens a connection to the Geographic Name Server, downloads the results, and closes the TCP/IP connection.

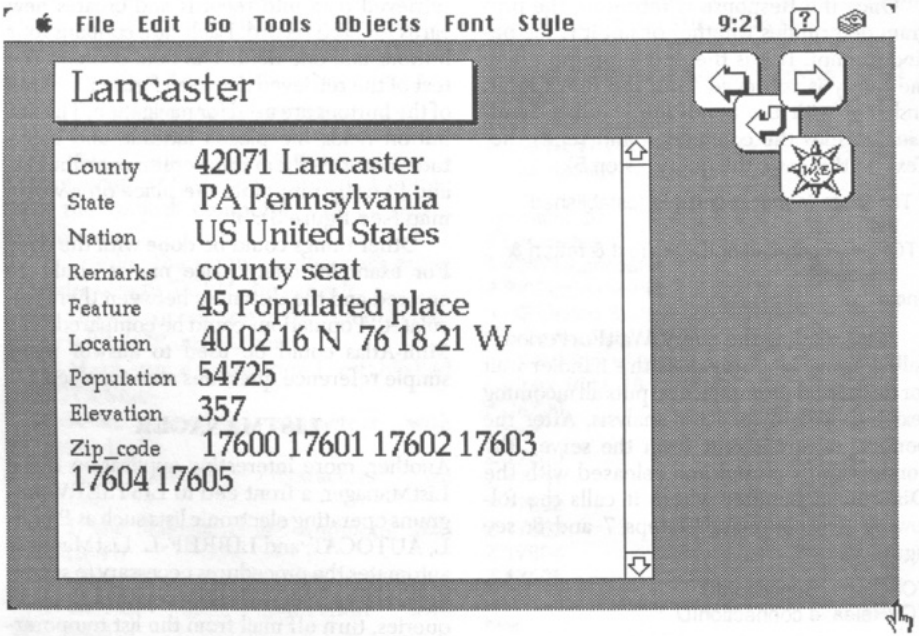

Figure 2. After the connection to the Geographic Name Server is closed, the data is formatted into human-readable form.

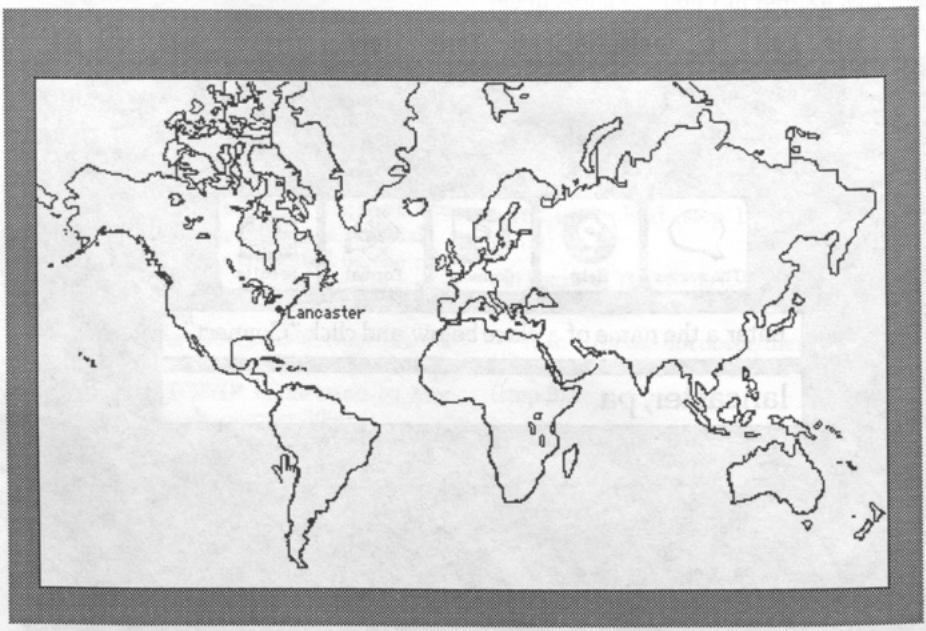

Figure 3. Finally, the user has the option of clicking the "Map" button. Consequently, the query's lattitude and longitude (location) are translated into screen coordinates and literally pinpointed on a world map.

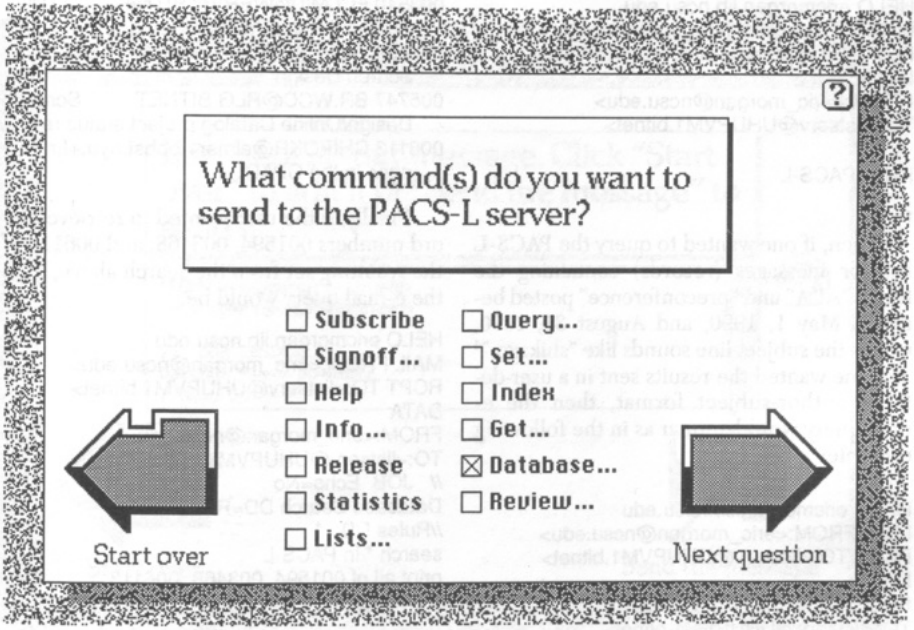

Figure 4. The ListManager implements a simple reference interview. During the interview the operator is asked, "What command(s) do you want to send the PACS-L [selected] server?" Information about the commands can be retrieved by clicking the question mark button.

simply by answering a few questions and clicking a few buttons. As the ListManager conducts a simple reference interview querying the user about LISTSERV needs, it creates a Simple Mail Transfer Protocol (SMTP) message. Using the XCMDs from the HyperCard TCP Toolkit, the ListManager sends the message to the user's mail server. In turn, the mail server forwards the message to the LISTSERV program, where it processes it and sends a reply to the user's e-mail address. There are two parts to the ListManager: the reference interview and the transmission of the resulting e-mail message. The reference interview process asks questions, and based on the answers to these questions, it asks other questions. When the question-and-answer process is complete, the result is an SMTP message. The first question asked is, What is your name? ListManager next asks for an e-mail address and the name of the user's mail server. It then asks, To what list do you want to send mail? Then it asks, Do you want to send mail to the server or to the participants of the list? Users choosing "participants" are given the opportunity to write a posting. On the other hand, if "server" is chosen, users are presented with the various commands that can be sent to the server, such as subscribe, unsubscribe, index, get, and review (see figure 4). See appendix B for Hypertalk scripts for ListManager.

Following are some example results of the reference interview process. If one wished to subscribe to PACS-L, then, using the author's e-mail address as an example, the e-mail query would be:

```
HELO ericmorgan.lib.ncsu.edu
MAIL FROM:<eric_morgan@ncsu.edu>
RCPT TO:<listserv@UHUPVM1.bitnet>
DATA
FROM:<eric_morgan@ncsu.edu>
TO:<listserv@UHUPVM1.bitnet>

subscribe PACS-L Eric Morgan

QUIT
```

On the other hand, if one wanted to retrieve a list of all the files available from PACS-L, then the e-mail request would take the following form:

```
HELO ericmorgan.lib.ncsu.edu
MAIL FROM:<eric_morgan@ncsu.edu>
RCPT TO:<listserv@UHUPVM1.bitnet>
DATA
FROM:<eric_morgan@ncsu.edu>
TO:<listserv@UHUPVM1.bitnet>

index PACS-L
.
QUIT
```

Then, if one wanted to query the PACS-L list for messages (records) containing the terms "ALA" and "preconference" posted between May 1, 1990, and August 31, 1990, where the subject line sounds like "shikago,"[4] and one wanted the results sent in a user-defined author-subject format, then the e-mail query would appear as in the following example:

```
HELO ericmorgan.lib.ncsu.edu
MAIL FROM:<eric_morgan@ncsu.edu>
RCPT TO:<listserv@UHUPVM1.bitnet>
DATA
FROM:<eric_morgan@ncsu.edu>
TO:<listserv@UHUPVM1.bitnet>

// JOB Echo=No
Database Search DD=Rules
//Rules DD *
S ALA preconference in PACS-L where sub-
    ject sounds like shikago from 90/1/5 -
to 90/31/8
F AS: #.6R0 "Record" From.25 "Author" Sub-
    ject.80 "Subject"
I AS
/*
.
QUIT
```

The output of a search similar to the one above looks like this:

```
> S 'ALA' preconference in PACS-L
—> Database PACS-L, 7 hits.

> F AS: #.6R0 "Record" From.25 "Author" Sub-
    ject.80 "Subject"

> I AS
Record Author                Subject
——————————————————————————————————
001594 UJMB00@SDNET.BITNET   ILL,
    Copyright and Internet Catalogs
003197 KATHY@BAKER.DARTMOUTH.EDU
    LITA Human-Machine Interface Interest
    Group pl+
003468 BR.WCC@RLG.BITNET     Screen
    design: since you asked
003540 FCLMID@NERVM.BITNET   LITA
    Screen Design Preconference
003654 LIBPACS@UHUPVM1.BITNET
    Screen Design
005747 BR.WCC@RLG.BITNET     Screen
    Design/Online Catalog project status re+
006113 CHIPOKR@elmer1.bobst.nyu.+Im-
    ages in the OPAC
```

Finally, if the user wanted to retrieve record numbers 001594, 003468, and 006113 of the resulting set from the search above, then the e-mail query would be:

```
HELO ericmorgan.lib.ncsu.edu
MAIL FROM:<eric_morgan@ncsu.edu>
RCPT TO:<listserv@UHUPVM1.bitnet>
DATA
FROM:<eric_morgan@ncsu.edu>
TO:<listserv@UHUPVM1.bitnet>
// JOB Echo=No
Database Search DD=Rules
//Rules DD *
search * in PACS-L
print all of 001594 003468 006113
/*
.
QUIT
```

Granted, an e-mail program could have created the first seven and last two lines of each of these examples, but everything in between is up to the user to supply. With the ListManager, all one has to do is answer some simple questions. The program does the rest.[5]

After the message has been created, it can be sent by clicking on the "Send the message" button (see figure 5). ListManager then resolves the sender's mail server's IP or name address (step 1 of the basic algorithm). This is done with the TCPNameToAddr XCMD. Next, the user opens a connection to the mail server on port 25 with the XCMD TCPActiveOpen. Port 25 is the standard port for SMTP mail transactions (step 2). Once a connection is established, then ListManager begins to send the message line-by-line with the SendLine handler (steps 3, 4, and 5). SMTP transaction prompts are numbers that correspond to a particular type of response. Numbers beginning with 5 are error messages. In general, numbers beginning with 2 or 3 mean there was no error and the dialogue can continue. Therefore, the ListManager uses a modified version of the WaitForPeriod function called GetResponse. GetResponse takes one argu-

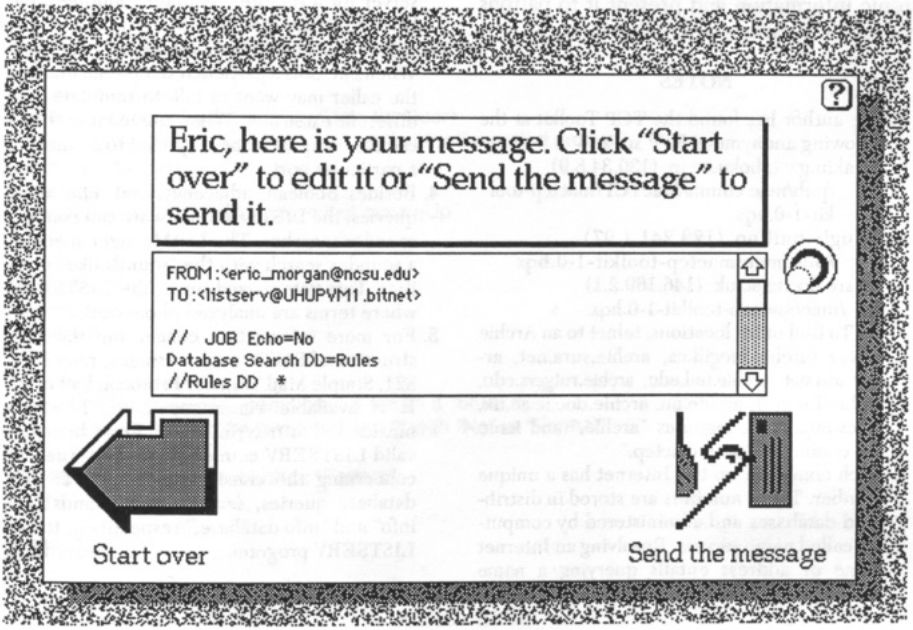

Figure 5. At the completion of the reference interview, the ListManager has created an SMTP mail message waiting to be sent by clicking the "Send the message" button witht he help of XCMDs from the HyperCard TCP Toolkit.

ment, a digit we want to receive from the mail server. If GetResponse "hears" the desired response, then the dialogue continues. Otherwise, an error is returned and the connection is closed (steps 7 and 8). After the entire text of the SMTP message has been sent, the connection is closed with the Disconnect handler (steps 7 and 8). After the connection is closed, the reply will arrrive at the e-mail address the sender supplied to ListManager.

SUMMARY

This article listed the necessary tools and outlined an algorithm for implementing TCP/IP communications with HyperCard. Two examples were then illustrated. In the first example, Mini-Atlas queries the Geographic Name Server and reformats the results into human-readable form, including placing them on a world map. In the second, ListManager uses a reference interview model to create an SMTP message any LISTSERV program can understand. The resulting message is then sent to a LISTSERV program, where it is analyzed and acted upon.

This article detailed the communications process because it is common to both applications. It is hoped that the communications process described here will spark the reader's interest in creating custom information tools. The stacks listed in the appendixes have been modified to create a tiny stack (38K) that logs on to Dialog, sends a previously saved search strategy, saves the results to another text file, and logs off. Modification of the stacks in the appendixes has also resulted in applications to read UseNet news and implement FTP transfers. It would be possible to create WAIS, Gopher, or World Wide Web clients simply by modifying the scripts given in this article.

The most difficult aspect of these applications is not the communications process but creating the messages and analyzing the received data. More effort went into translating the output of the Geographic Name Server into human-readable form than went into scripting the communications process. More toil was involved in learning the ins and outs of the SMTP protocol and in creating an SMTP message than in scipting the communications processes involved in ListManager. The scripts described here exemplify one librarian's attempt to gain control over elec-

tronic information and present it to patrons and other librarians in a usable form.

NOTES

1. The author has found the TCP Toolkit at the following anonymous FTP sites:
   akiu.gw.tohoku.ac.jp (130.34.8.9)
   /pub/mac/comm/MacTCP/mactcp-toolkit-1-0.hqx
   ugle.unit.no (129.241.1.97)
   /pub/mac/mactcp-toolkit-1-0.hqx
   src.doc.ic.ac.uk (146.169.2.1)
   /mac/mactcp-toolkit-1-0.hqx
   To find other locations, telnet to an Archie server (archie.mcgill.ca, archie.sura.net, archie.ans.net, archie.unl.edu, archie.rutgers.edu, archie.funet.fi, archie.au, archie.doc.ic.ac.uk, or cs.huji.ac.il), logon as "archie," and issue the command "prog mactcp."
2. Each computer on the Internet has a unique number. These numbers are stored in distributed databases and administered by computers called name servers. Resolving an Internet name or address entails querying a name server for a remote computer's unique number, i.e., its address.
3. A port is analogous to a telephone extension. When one calls a particular telephone number the caller may want to talk to someone on a different extension. When one connects to a remote computer, one may want to connect to a particular port.
4. Besides Boolean, adjacency, and date range queries, the LISTSERV software can conduct soundex searches. The ListManager specifies a soundex search with the "sounds like" qualifier. This gets passed on to the LISTSERV, where terms are analyzed phonetically.
5. For more information concerning the construction of SMTP mail messages, read RFC 821, Simple Mail Transfer Protocol, by Postel. It is available via anonymous FTP from nic.ddn.mil as /rfc/rfc821.txt. For a listing of valid LISTSERV commands and information concerning the construction of LISTSERV database queries, send the commands "get info" and "info database," respectively, to any LISTSERV program. ■■

APPENDIX A.
HYPERTALK SCRIPTS FOR MINI-ATLAS

```
-- query the Geographic Name Server --

on mouseUp
  global connectionID

  lock screen
  set cursor to busy

  -- clear the terminal screen, a place to hold the results of the query
  put empty into card field "theTerminal"

  -- resolve the name
  prompt 1, "Resolving address for martini.eecs.umich.edu"
  -- this is a Rinaldi XCMD

  set cursor to busy
  put item 1 of TCPNameToAddr("martini.eecs.umich.edu",,) into theIPAddress
  if theIPAddress contains "§" then

    -- an error occurred in resolving the address
    prompt 3
    answer "There was an error resolving the address for martini.eecs.umich.edu." & ¬

    return & return & theIPAddress
    exit mouseUp
  end if

  -- open the connection
  prompt 2, "Opening a connection to martini.eecs.umich.edu."
  set cursor to busy
  put TCPActiveOpen(theIPAddress, 3000, 0) into connectionID
```

```
  — the server lives on port 3000
  prompt 2, "Waiting for the period prompt."
  if WaitForPeriod() is "false" then exit mouseUp

  — send the query
  put line 1 of card field "theQuery" into theQuery
  prompt 2, "Getting response(s) and waiting for the period prompt"
  set cursor to busy
  sendLine theQuery
  if WaitForPeriod() is "false" then exit mouseUp

  — clean up
  sendLine "Quit"
  Disconnect
  prompt 3

  — notify operator
  answer "The retrieval is complete." & return & return & ¬
  "Do you want the results formatted now?" with "No" or "Format"
  if it is "Format" then
    send mouseUp to card button "Format"
  end if

end mouseUp


-------------------------
— send a line of text —
-------------------------
on sendLine theText
  global connectionID

  — send the text to the connection
  if TCPState (connectionID) is "established" then
    TCPSend connectionID, theText & return & linefeed
  end if

  — display the text in the terminal window
  put theText & return after card field "theTerminal"

end sendLine


-------------------------------
— wait for the period prompt —
-------------------------------
function WaitForPeriod
  global connectionID

  — wait for the period (".") prompt
  repeat forever
    repeat 25 times
      put TCPRecvUpTo( connectionID, linefeed, 60, empty ) into theResponse
      set cursor to busy
      if theResponse is not empty then exit repeat
    end repeat

  — strip the linefeed character
  delete the last character of theResponse

  — display the response
```

```
  put theResponse after card field "theTerminal"
    — analyse the response
  put the first character of theResponse into theCharacter
  if theCharacter is "." then

    — got the period prompt
    put "true" into theReturnCode
    exit repeat

  end if

 end repeat

 — return from the function
 return theReturnCode

end WaitForPeriod

————————————————
— close the connection —
————————————————
on Disconnect
 global connectionID

 — release the connection
 TCPClose connectionID
 TCPRelease connectionID

 — dismiss the notification
 prompt 3

end disconnect
```

APPENDIX B.
HYPERTALK SCRIPTS FOR THE LISTMANAGER

```
————————————
— send the message —
————————————
on sendTheMessage
 global theMailServer, connectionID, theWholeMessage

 — resolve the name
 put item 1 of TCPNameToAddr(theMailServer,,) into theIPAddress
 prompt 1, "Resolving address for " & theMailServer
 if theIPAddress contains "§" then

  — an error occurred in resolving the address
  prompt 3
  answer "There was an error resolving " & theMailServer & "." & return & return & theIPAddress
  hide card field "theTerminal"
  exit sendTheMessage
 end if

 — open a connection
 put TCPActiveOpen(theIPAddress, 25, 0) into connectionID  — port 25 is the SMTP socket
 prompt 2, "Opening a connection to " & theMailServer
```

```
  if getResponse("2") is "false" then exit sendTheMessage
   — send the HELO message
  put line 1 of theWholeMessage into theHELOCommand
  sendLine theHELOCommand
  if getResponse("2") is "false" then exit sendTheMessage

  — send the MAIL message
  put line 2 of theWholeMessage into theMAILCommand
  sendLine theMAILCommand
  if getResponse("2") is "false" then exit sendTheMessage

  — send the RCPT message
  put line 3 of theWholeMessage into theRCPTCommand
  sendLine theRCPTCommand
  if getResponse("2") is "false" then exit sendTheMessage

  — send the DATA message
  put line 4 of theWholeMessage into theDATACommand
  sendLine theDATACommand
  if getResponse("3") is "false" then exit sendTheMessage

  — send the message
  put the number of lines of theWholeMessage into theNumberOfLines
  repeat with i = 5 to theNumberOfLines
    put line i of theWholeMessage into theText
    sendLine theText
    idle
  end repeat

  — clean up
  prompt 3
  disconnect
  hide card field "theTerminal"

end sendTheMessage

-------------------------------------------------
— get and analyse the server's  response —
-------------------------------------------------
function getResponse aValidResponse
  global connectionID

  — wait for a response
  repeat 25 times
    put TCPRecvUpTo( connectionID, linefeed, 60, empty ) into theResponse
    if theResponse is not empty then exit repeat
  end repeat

  — analyse the response
  put the first character of theResponse into theCharacter
  if theCharacter is aValidResponse then

    — strip the linefeed character
    delete the last character of theResponse

    — display the response
    put return & theResponse after card field "theTerminal"

    return true
```

```
  else if theCharacter is "5" then
    — an error occurred
    prompt 3
    delete the last character of theResponse
    answer "There was an error." & return & return theResponse
    TCPRelease connectionID

    return false
  else if theResponse is empty then

    — there was no response
    prompt 3
    hide card field "theTerminal"
    answer "The remote computer is not responding."
    TCPRelease connectionID

    return false

  else

    — an unknown error occurred
    prompt 3
    answer "An unknown error occurred. Call Eric."
    TCPRelease connectionID

    return false

  end if

end getResponse
```

News and Announcements

New Address for Manuscripts and Correspondence

Please note that Tom Leonhardt, the editor of *ITAL*, is now located at the University of Oklahoma as the director of Library Technical Services. He may be reached at the following addresses and phone numbers:

The University of Oklahoma
Bizzell Library
401 W. Brooks
Norman, OK 73019-0528
Voice: (405) 325-2611
Fax: (405) 325-7550
Bitnet: QC6305@UOKMVSA

Unicode Consortium Announces Merger of Multilingual Standards

Spearheading the effort to simplify the development of global information systems, the Unicode Consortium has announced the successful merger of Unicode's multilingual encoding standard with the recently approved ISO 10646 developed by the International Standards Organization (ISO). This new merged standard will make multilingual software easier to write, information systems more powerful yet easier to manage, and international information exchange more practical.

The new ISO 10646 standard was approved by an overwhelming majority of the voting ISO member countries. These countries expressed a strong desire to merge ISO 10646 with Unicode's sixteen-bit encoding solution. Unicode worked closely with the nation ISO member bodies, which met last summer in Seoul, Korea, to finalize editing on the approved standard.

The Unicode Consortium will continue to cooperate with ISO on future enhancements of the standard, coordinating the efforts of coding experts on standardizing modern and historical writing systems as well as technical and publishing symbols.

Additionally, the consortium provides support for implementors, addressing the complex issues of internationalization and large character sets. On this basis, the consortium will continue its series of workshops for implementors of the standard, which serve as a forum for the exchange of implementors' ideas.

Unicode, Inc., is a consortium of diverse computer companies dedicated to maintaining and promoting a sixteen-bit standard for multilingual text and character encoding. These companies include Adobe, Alis Technologies, Apple Computer, Borland, Canon Research Center America, Digital, Ecological Linguistics, GO Corp., Hewlett-Packard, IBM, Metaphor, Microsoft, NeXT, Novell, The Research Libraries Group, Sun Microsystems, Symantec, Taligent, Unisys, Univel, WordPerfect, and Xerox.

The Unicode 1.0 standard contains more than 30,000 characters and encompasses most of the world's languages, as well as mathematical and scientific symbols. In 1991, the consortium published *The Unicode Standard Worldwide Character Encoding, Version 1.0, Volume I*. A second volume documenting the 21,000 characters of a unified encoding for Chinese, Japanese, and Korean (CJK) writing systems has recently become available. The new merged standard, ISO 10646, contains additional characters that the consortium will document as soon as possible. Unicode also plans to produce an updated Unicode Standard, version 1.1, by the end of the year.

For more information on Unicode membership, call (415) 961-4189, or write to Unicode, Inc., 1965 Charleston Road, Mountain View, CA 94043, attention: Steven A. Greenfield, Office Manager. ■■

CLASS Testimony at NREN Forum

CLASS Executive Director Robert A. Drescher presented testimony on CLASS' concerns about the role of libraries and information services in the National Research and Education Network (NREN) at an open forum in Washington, D.C., July 21, 1992. The forum, conducted by the U.S. National

Commission on Libraries and Information Science (NCLIS), sought comments and suggestions from representatives of libraries and other members of the information community. The forum's findings will be made available to the Office of Science and Technology Policy (OSTP) prior to the December 1992 OSTP report to Congress on the NREN.

Major areas to be covered in the report to Congress include:

- Funding of the network,
- Future operation and evolution of the network,
- Fees for commercial use of the network,
- Technological feasibility of commercial use of the network,
- Copyright protection, and
- Security of resources and privacy of users of networks.

As a major provider of access to the Internet for libraries, CLASS plans to take a significant role in recommending the future course of the Internet and its development into the NREN. To comment on the Internet or NREN, contact CLASS at 1-800-488-4559, fax 1-408-453-5379, Internet CLASS@CLASS.ORG. ■■

NOTIS Demonstrates Full Z39.50 Interoperabilty and Introduces Two Z39.50-based Products

On June 4, 1992, NOTIS Systems, Inc., demonstrated full NISO Z39.50 version 2 interoperability with the Coalition for Networked Information (CNI) test bed site at the University of California Department of Library Automation (DLA). As part of the test, the NOTIS client exchanged standard Z39.50 protocol elements with the DLA server and performed several intersystem searches. Since that time NOTIS has interacted successfully with servers at OCLC, AT&T, UC Berkeley, Penn State, and MIT.

Z39.50 is the standard for communication between computers for information retrieval. The Z39.50 standard grew out of the Linked Systems Project and provides for the retrieval of bibliographic records independent of the type of system on which they are stored. A system using Z39.50 can communicate across the TCP/IP Internet to any other system using 239.50.

New NOTIS products built on the 239.50 protocol include PACLink, a patron resource-sharing system that allows a user at one site to search the online catalog at another site and leave a document-delivery request, and InfoBase, a UNIX-based database server that operates on a number of hardware manufacturers' platforms.

PACLink seamlessly interconnects a library's Online Public Access Catalog (OPAC) to other libraries' holdings through an OPAC-to-OPAC connection and automatically processes requests for document delivery and interlibrary loans. PACLink is fully integrated into the current OPAC and communicates with remote libraries using Z39.50 via the TCP/IP Internet. PACLink was developed in cooperation with the state universities in Indiana and the graduate centers of the State University of New York.

The PACLink system is made up of two components, PACSearch and PACLoan. PACSearch allows patrons to easily connect to other libraries' online catalogs through menu selections. While connected to remote catalogs, patrons use the same interface and full search capabilities as in their local catalog. With PACSearch, patrons do not need to learn different library systems to have access to multiple libraries' holdings.

PACLoan provides the automated processing of patron-initiated loan requests. Through a request screen, patrons specify materials, delivery method, and validation. PACLoan automatically checks the local library's catalog to determine the status of requested materials. The borrowing interlibrary loan office may approve all requests before they are electronically communicated to the lending library.

At the lending library, PACLoan tracks incoming requests and gives the library staff online edit, approval, and current status capabilities. PACLink allows unfilled loan requests to be automatically resent to other libraries.

InfoBase offers a cost-effective way to mount and access local databases. It uses a powerful, full-featured search engine and is built on Z39.50 communication protocols. InfoBase's high-performance configuration allows multiple simultaneous users to access online databases on affordable UNIX platforms.

InfoBase has a fully functional search engine that supports Boolean search, proximity, and adjacency functions. The same search techniques are used to access all databases.

For existing NOTIS customers, InfoBase provides full compatibility with the online catalog, including hook to serial holdings for citation databases. Any institution with a Z39.50 client may also access InfoBase, either on the campus Ethernet or across the Internet.

InfoBase is the first Z39.50 server designed to index and deliver large databases efficiently. It offers libraries greater system flexibility and expanded patron access at an affordable cost. ■■

Blackwell Joins PUBNET

Blackwell North America has joined PUBNET, the electronic book ordering network. Ordering to selected publishers began last June, and network participation was expected by September 1992.

PUBNET membership is the latest step in Blackwell's strategy of applying electronic technology to traditional library bookselling. Electronic ordering from publishers compliments Blackwell's online databases and acquisition services, including New Titles Online (NTO), which is available via the Internet. ■■

VTLS Announces Continued Profitability, Client Benefits, Staff Growth

Vinod Chachra, president of VTLS Inc., announced that for the fiscal year ending June 30,1992, the company exceeded all corporate goals vis-a-vis project development, revenues, and profits. Despite a nationwide recession and limited state and federal monies available in library budgets, VTLS showed its sixth consecutive profitable year.

Continued growth and prosperity benefitted VTLS employees this year and will benefit VTLS clients in the coming year. Employees received a salary bonus, and clients will see no increase in maintenance costs, except in the case of hardware upgrades.

Staff grew from fifty-three to sixty-four employees over fiscal year 1991–92. This fall, the company is planning to expand its staff by another 20 percent. The thirteen new staff members are slated to handle contracts on hand and obligations of new contracts, and to manage anticipated growth, particularly in the field of imaging and multimedia information. The new staff will be added in the development and customer services departments. The increase in staff will edge VTLS' annual payroll past the $2 million mark. ■■

VTLS Develops Electronic Encyclopedia Prototype

VTLS Inc. has developed a prototype of an electronic encyclopedia that currently incorporates full text and will soon incorporate images into the current VTLS software. The development of the prototype was made possible by a technological demonstration grant from BRA BÖCKER, publishers of the *Swedish National Encyclopedia.* Using existing VTLS features and the current VTLS database structure, the prototype allows VTLS users to search for information in an online encyclopedia just as they would search for a book or periodical in a library's catalog.

In the implementation of the electronic encyclopedia, a Hewlett-Packard 3000 computer stores the file-indexing system and acts as a file server for the data, which is maintained in a separate database. The HP computer stores full text (and soon images), which can be accessed with one VTLS command from the Intelligent Workstation (VTLS-IW) software running on a microcomputer. VTLS-IW acts as a client to the HP machine, which acts as a server. The system provides an easy-to-use interface to the encyclopedia information.

Access to the multimedia encyclopedia is seamlessly integrated with the VTLS online public access catalog. First, VTLS-IW accepts and interprets the encyclopedia user's commands. Next, it interacts with VTLS running on the HP computer. Then it formats and displays the information associated with the user's request. In this way, a user is able to browse an alphabetical index of the encyclopedia, pull up full text and images, and through hypermedia links, find related materials contained in the library's collection.

"Converting books into high quality, machine-readable text and images that can be disseminated over a network means efficient information access. It also holds the promise of liberating the information worker from locational barriers to information access," said Kari Marklund, chief editor of the *Swedish National Encyclopedia.* "Our interest in funding this unusual project was to experiment with alternative delivery channels for the vast

information contained in the *National Encyclopedia.*" ■■

Important Scholarly Resources Added to RLIN

Two important scholarly resources have been added to the Research Libraries Information Network (RLIN): Over 900,000 citations representing the Rigler and Deutsch Record Index (RDI) and over 75,000 citations for art catalogs from the University of California at Santa Barbara Arts Library. Both resources are available online only on RLIN.

RDI is a union catalog of pre-LP disks held as of 1981 by the Library of Congress; The New York Public Library; and Stanford, Yale, and Syracuse universities, which are members of the Associated Audio Archives Committee of the Association for Recorded Sound Collections (AAAC/ASRC). RDI cites approximately 90 percent of all pre-LP disks produced in the United States from the 1890s to the 1950s and a significant part of the global output for the same period.

The RDI citations, which are located in the RLIN recordings (REC) file, include titles, composers, performers, record company names, and record company numbers, all of which are searchable on RLIN. The records cover a wide range of materials: popular and classical music, speeches, sound effects, and even bird calls. RDI is the only resource to broadly document the development of the entire sound recording industry from its beginnings to LP recordings.

The UCSB Arts Library catalogs, broad and international in scope, cover art of all types and periods and come from museums, galleries, institutions, foundations, and individual private collections throughout the world. The library has catalogs from as far back as the mid-eighteenth century, but its collection is strongest in catalogs from the last twenty-five years. The collection provides enhanced subject access to the material, with up to five subject headings per catalog, all of which are searchable on RLIN. ■■

RLG Forms Task Force on Photo Preservation

The Research Libraries Group (RLG) has formed a six-member task force to address issues inherent in preserving large photograph collections.

The group's charge is to evaluate available needs-assessment and planning tools used in managing large photograph collections; design a project to investigate and demonstrate the use of electronic technologies—such as CD-ROMs—in reformatting large, endangered photo collections; and suggest other ways institutions could work together to preserve and improve access to photographic research collections.

Serving on the task force are Jeffrey Horrell, librarian of the Fine Arts Library at Harvard's Fogg Art Museum; Jackie Dooley, head of collections cataloging at the Getty Center for the History of Art and the Humanities; Anne Kenney, associate director of the Department of Preservation at Cornell University; Debbie Hess Norris, assistant director of the Art Conservation Program at the Winterthur Museum/University of Delaware; and James Reilly, director of the Image Permanence Institute at the Rochester Institute of Technology. Patricia McClung, RLG's associate director for programs, staffs the task force.

The task force is an outgrowth of a 1990 RLG symposium that focused on the problems repositories have in managing and preserving large photographic collections, with special emphasis on finding collaborative solutions. The committee is expected to complete its work by September 1, 1993.

For more information, please contact Patricia McClung at RLG, phone (415) 691-2236; e-mail BL.PAM@RLG.BITNE or BL.PAM@RLG.STANFORD.EDU. ■■

OCLC Issues Linking Strategy for the Internet and the NREN

"OCLC's Linking Strategy: Internet and NREN" has been sent to the OCLC membership. The three-page document describes OCLC's plans and policies between 1992 and 2000 with respect to linking with the Internet and the emerging National Research and Education Network (NREN).

In a letter to directors of OCLC libraries that accompanied "Linking Strategy," K. Wayne Smith, president of OCLC, stated:

> OCLC is committed to linking with both the Internet and the NREN. Indeed, OCLC is already linked to the Internet for reference ser-

vices—EPIC and FirstSearch, and soon, the new *Online Journal of Current Clinical Trials*. In 1993, will test cataloging on the Internet. We have been strong supporters of the NREN from the beginning and are closely watching its development in terms of operations, economics, and policies that are significant to the library community.

The document assesses the OCLC network and the Internet/NREN in terms of governance, performance/support, economics, and future considerations. The introduction states:

> The OCLC network has always been and will remain a means to an end. Before alternatives such as the Internet and the NREN, it was a necessary means. In terms of availability, reliability, and performance, it will continue to be a highly desirable means. Whether it remains a necessary means will depend on a number of factors over which OCLC has little control. Simply because of the current economics of telecommunications, however, we at OCLC believe that, over time, a transition from the OCLC network to the Internet and the NREN is likely. OCLC's basic objective is to help make this transition as smooth as possible for its membership. OCLC is committed to increasing access to the world's information and reducing the rate of rise of costs of that information. OCLC is not committed to maintaining a proprietary network, or any other means to those ends, that is not in the membership's best interests.

In the 1992–1995 time frame, OCLC will continue to provide Internet access to its reference services and move to broaden access to the Internet and the NREN. It will provide batch-file transfer of records on the Internet. It will also explore providing cataloging and resource sharing services on the Internet.

In the 1995–2000 time frame, OCLC intends to be a significant voice for libraries and to play a leadership role in a twenty-first-century telecommunications infrastructure that integrates voice, data, and images on the same communications lines in a truly global information network.

To obtain a copy of "OCLC's Linking Strategy: Internet and NREN," write to Internet White Paper, OCLC, MC 204, 6565 Frantz Rd., Dublin, Ohio 43017-3395. ■■

John Popko Becomes Users Council President

John Popko became 1992–93 president of the OCLC Users Council on August 1, 1992. He succeeded former president Pat O'Brien, who became ineligible to serve on council because of a recent change of position. A special election for a new 1993–94 vice-president/president elect was scheduled for the fall 1992 meeting of the council in Dublin, Ohio.

Popko is assistant director of Technical Services at the University of Missouri-Kansas City, and a Users Council delegate from the Missouri Library Network Corporation. He was elected vice-president/president elect by the Users Council in June 1992.

In June 1992, O'Brien was elected Users Council president and was also elected to a six-year term on the OCLC board of trustees beginning in 1992. He has since resigned as director of the Dallas Public Library, where he was a Users Council delegate from AMIGOS, to become director of the Alexandria Public Library, Alexandria, Virginia. O'Brien will continue to serve on the OCLC board. ■■

OCLC Expands Sunday Telecommunications for Reference Services

The OCLC network now provides dial and dedicated-line access to OCLC's online reference services—The FirstSearch Catalog, the EPIC service, the "Online Journal of Clinical Trials"—on Sundays. These had been available on the Internet on Sundays. All three services are now available via the OCLC network or the Internet seven days a week, from 6 a.m. to 11 p.m. (Eastern time) Monday through Friday, 8 a.m. to 8 p.m. Saturday, and noon to 8 p.m. Sunday. ■■

New WLN Conspectus Software Debuts

Release 4.0 of the WLN Conspectus Software, with greatly increased collection-assessment capabilities and a wide range of new features, is now available to libraries and consortia throughout the United States. The WLN Conspectus is an ALA-approved and nationally recognized method for assessing both Dewey and LC classified collections. Release 3.4 of the WLN Conspectus Software

is currently in use by hundreds of libraries and groups of libraries of all types and sizes.

Of special interest to collection development librarians and library administrators are two powerful new data files: the Management Information File and the Collection Analysis File.

The Management Information File allows the user to store and group local data such as circulation, acquisitions, and interlibrary loan statistics by conspectus divisions and categories, providing precise collection-management information.

The Collection Analysis File supports the loading of statistical breakdowns of a collection by publication date, format, language, and other criteria selected by the library, arranged by conspectus line number. These statistics are derived from collection analysis report processing performed by WLN on a library's MARC or non-MARC database.

Other major enhancements include:

- The screen incorporates desktop features of FoxPro2, with pull-down menus, windows, and mouse support.
- All reports are displayable online as well as in printed form.
- Worksheet and assessment files can be searched by call number and call number reports can be produced.
- Boolean and truncated searching of assessment comments fields are provided.
- Reports can be printed on a variety of wide-carriage printers. ■■

WLN Offers New Authority Control Options

WLN's MARC Record Service (MARS) now offers authority matching and updating of National Library of Medicine MeSH subject headings and Library of Congress Children's subject headings in addition to standard Library of Congress subject headings. MARS is WLN's comprehensive database-preparation and authority control service that includes retrospective conversion, deduping, merging of holdings and local data, bibliographic upgrading, authority control, item record conversion, smart bar code generation, and ongoing database updating.

The WLN MARC Record Service now provides a high degree of customization in its authority updating and notification service. WLN maintains a copy of a customer's authority file after initial authority control processing has been completed and supplies new and updated authority records or printout of these records according to the library's specifications. For example, a library may choose to receive only MARC authority update records which have changes to the 1xx, 4xx, and 5xx fields along with an accompanying summary report of other changes to the authority records. Many other options are available to ensure the most accurate and current authority file possible for every customer. ■■

WLN Adds LAG Reference Databases to WLN Online System

Three of the Information Access Company's most popular indexing and abstracting services will soon be available through WLN. IAC's *Magazine Index/Plus*, *Business Index & Company ProFile*, and *Expanded Academic Index* will be provided to all WLN customers on a trial basis through the WLN Online System beginning in the fall of 1992.

Magazine Index/Plus is a comprehensive index to over 400 of the most popular and widely read magazines. Subject areas covered include current affairs, consumer information, travel, arts, and entertainment. The index includes the most current sixty days' indexing of the *New York Times*.

Business Index includes indexing of over 800 business, management, trade journals, and newspapers, along with business-related articles from over 3,000 other publications. It contains abstracts for approximately 150 major management and computer journals. Newspaper coverage includes the business and financial sections of the *New York Times*, *Wall Street Journal*, *Asian Wall Street Journal* and the *Financial Times of Canada*, as well as business-related articles from other national newspapers. *Company ProFile* contains directory listings for over 100,000 private and public companies.

Expanded Academic Index provides indexing and abstracting of approximately 1,500 scholarly journals covering the humanities, social sciences, and science and technology with emphasis on areas of high academic interest such as communication studies, computer science, engineering, environmental studies, and women's studies. It also includes indexing for the last six months' *New York Times*. ■■

Recent Publications

Book Reviews

Automating School Library Catalogs: A Reader. Ed. by Catherine Murphy. Englewood, Colo.: Libraries Unlimited, 1992. 211p. $27 (ISBN 0-87287-771-X).

The editor, Catherine Murphy, is chair of the Technology Committee of the American Association of School Libraries. She has selected twenty-three authoritative articles, chiefly from school library literature, most of which have been published within the past three years. For school librarians with limited budgets, limited resources, and limited time to learn about automating school library catalogs, this is a valuable addition to the professional literature.

Five major sections provide the basic structure: "Overview of OPAC Development"; "Evaluating OPAC Systems"; "Implementing OPAC Systems"; "Issues in OPAC Development"; and "OPAC Research." Theory is combined with practice as the editor moves from general issues, to comprehensive "laundry lists" of desired OPAC features and vendor comparison charts, to case studies of actual systems. The articles vary greatly in length, from short, almost personal narratives to long reviews of the literature. All are very readable and to the point.

Automated catalogs in the United States and Canada are covered. Since many library systems developed in Canada are now being marketed in the United States, this is a useful guide to them as well. The articles are timely, enhanced by the editor's effort to contact the authors for current information. In a field where information goes out of date quickly, this is a real benefit to the reader. The bibliography contains about thirty listings, which provide additional assistance on specific areas of automation. The index is comprehensive.

This collection is not just for school library media center personnel. Readers in small to medium-sized public libraries will find it equally valuable. Children's librarians will find its discussion of research needs of K-12 users relevant, and catalogers of materials for children will find its discussion of MARC records and bibliographic utilities a much-needed resource. Certainly, no school district should be without this fine collection of readings.—*John A. Richardson, Suffolk Cooperative Library System, East Moriches, New York.* ■■

Cleveland, Gary. *Electronic Document Delivery: Converging Standards and Technologies.* UDT Series on Data Communication Technologies and Standards for Libraries, report no.2. Ottawa, Canada: International Federation of Library Associations and Institutions, International Office for Universal Dataflow and Telecommunications, 1991. paper, $35 (ISBN 0-9694214-2-7).

Gary Cleveland of the National Library of Canada has produced a study that aims to "provide librarians with a basic resource for technologies and standards that have potential for use in electronic document delivery, and to provide examples of how they may be used to perform this task" (p.4). He has succeeded admirably in his intent, presenting a clear, cogent description of the elements involved in computerized document delivery, as well as the technologies and standards that are enabling progress in this area.

Electronic document delivery is currently, and will continue to be, one of the most exciting, dynamic, and important areas of information provision. Technological developments that facilitate it are occurring constantly, but they mean nothing without the development and acceptance of standards. Cleveland points out that important converging technologies include those in electronic document conversion and generation, storage, workstations, communications, and hard-copy production by fax and laser printing. Since the essence of making these technologies interconnect is standardization, technology is not important without standards; nor are standards important without technology.

The book is organized into seven chapters, which are divided into clearly delineated sections, making use for reference purposes easy. The introductory chapter is followed by "Current Patterns in Document Delivery," outlining available technologies, and "Overview of Convergent Technologies," describing these technologies in detail. "Electronic Document Delivery Applications" is the heart of the book, describing the applications that need to be assembled to make fully electronic document delivery work. Completely automated document delivery would involve electronic document selection, request management, document retrieval, and document transfer. Cleveland shows how all of these are possible; separate components that perform these functions exist but have not yet been put together.

Cleveland proceeds to describe "Electronic Document Delivery Projects," including Ariel (software for transmission of documents over the Internet), Adonis (Article Delivery Over Network Information System—a National Agricultural Library project), and the Mercury Project at Carnegie Mellon University. His discussion of "Issues in Electronic Document Delivery" includes copyright, scholarly communication, developing nations, document integrity, and bibliographic control. Cleveland concludes by describing the factors that will lead to the slow evolution of electronic libraries. The book also includes an extensive list of references and listings of related standards. Clear illustrations are also provided in profusion. Although the study dates from 1991, none of its elements have dated in a meaningful way.

Although Cleveland's study is not for the uninitiated, as far as technology and standards go, it is a cohesive, lucid explanation of its topic—electronic document delivery. This is one of the most vitally important topics in information delivery today, and the interested reader could do no better than to pick up this book.—*Pat Ensor, University of Houston Libraries.* ■■

Dewey, Patrick R. *202+ Software Packages to Use in Your Library: Descriptions, Evaluations, and Practical Advice.* Chicago: American Library Assn., 1992. 190p. paper, $27.50 (ISBN 0-8389-0582-X).

Since publication of the first edition of this work in 1987 under the title *101 Software Packages to Use in Your Library,* Dewey has reviewed or updated earlier reviews of twice as many software packages, which are included in this volume. The work actually contains 256 titles. Dewey hopes to issue the next update, predictably under the title *303+ Software Packages*, within two years.

Two sources determined inclusion: librarians' favorable reports of software used in library applications and Dewey's own assessment of review copies he received. Unfortunately, Dewey's methodology leads to spotty inclusion. The chapter on CD-ROM products, for example, includes only eight titles in four pages (with a few more scattered throughout the text). General software, such as standard database managers, spreadsheets, and word processors, are mixed with specialized library software products and are also not comprehensively covered.

There are some strengths to this work, however. The reviews of each package are clear, concise, and informative. Each entry lists the product name, program type, vendor, cost (when available), general hardware requirements, description, and an assessment of the software's documentation. Review sources and related programs are listed when applicable. The work is well organized and indexed.

Most importantly, here is a source for recommended, library-specific applications software often unavailable in other sources. A number of the packages listed in the chapter on integrated systems, for example, are not covered in the recently expanded Automation Marketplace review that appears in the April 1, 1992, issue of *Library Journal*. When used in conjunction with other basic sources of evaluative software information, *202+ Software Packages* can round out the effort to identify the best product to meet a specific library automation need.

This work will be particularly useful for those searching for specialized software packages, such as programs to inventory sheet music collections, keep track of textbooks and equipment, or teach library skills. Those looking for PC-based acquisitions, serials, circulation, online catalog, or integrated modules will also find this title helpful.

This reviewer recommends that in the next edition of this work Dewey be more comprehensive in the coverage of library-specific applications. Unless, for example, a much broader cross-section of titles on CD-ROM can be included, this burgeoning area of the automation marketplace would best be eliminated from the text. Dewey should consider adding multimedia library software and applications that have been adapted to local area networks andnewer operating environments (Windows and OS/2). On the other hand, the general spreadsheet, database management, and word processing software might well be eliminated. Information on these products is much more readily available than for the applications designed exclusively for library use.

202+ Software Packages is recommended for computer novices and those looking for PC-DOS- or Apple-based library-specific software. Others may wish to pass up this title in favor of more comprehensive sources.—*Elizabeth D. Nicols, Stockton-San Joaquin County Public Library, Stockton, California.* ■■

Enhancing Access to Information: Designing Catalogs for the Twenty-First Century. Ed. by David A. Tyckoson. New York: Haworth, 1991. 243p. $29.95 (ISBN 1-56024-219-1).

This book, originally published as volume 13, numbers 3 and 4, of *Cataloging & Classification Quarterly*, consists of a collection of papers edited and introduced by David A. Tyckoson. The first section, titled "Past Problems and Present Solutions," by Tyckoson, reviews the origins of the modern catalog and outlines current techniques used in catalogs: journal indexing, linking holdings, enhancing bibliographic records, improving search techniques, linking systems, loading encyclopedias and other types of information into catalogs, and using authority control. The remaining sections of the book expand on these topics.

The second section contains four papers on enhancements to the traditional catalog. Jim Dwyer describes a project at California State University at Chico to enhance bibliographic records with content notes based on tables of contents of books. Richard O. Syracuse and Robert K. Poyer describe a project at the Medical University of South Carolina in which bibliographic records were created for vertical file materials, NLM bibliographies, and reserve materials, and subject access was provided for individual chapters in books and for articles in monographic serials. William E. Studwell suggests methods for increasing the effectiveness of subject access. Irving E. Stephens suggests ways in which call numbers, holdings, locations, and circulation status information should be displayed.

The section titled "Building Better Search Engines" contains a paper by Mary Micco in which she describes a pilot project to design a hypertext search engine for a system that will apply different strategies depending on the number of hits received. The database for this system would contain "enriched" records with the addition of table-of-contents information; software-generated "see" and "see also" references would be developed; and subject headings would be linked to class numbers.

"Linking Systems for Remote Access" includes papers by Bernard G. Sloan on design implications for the online catalog providing remote access and by Genevieve Engel on instruction for users of catalogs that provide access to catalogs and databases through the Internet.

The section titled "Building the Catalog through Non-Traditional Databases" contains three project reports. Susan Barnes and Janet McCue present results of a Cornell study on data elements for linking citations from *Agricola* and *BIOSIS* to Cornell's holdings. Their study shows that the presence of ISSN, ISBN, LCCN, and CODEN cannot be assumed in citation databases. Richard Harwood reports on a project to add a Penn State collection of audiovisual materials, not housed or maintained by the library, to the Penn State catalog. Kathy Carter, Hope Olson, and Sam Aquila report on adding records for microforms to the University of Alberta catalog through batch loading of tapes containing cataloging for complete sets of major microforms.

The final section, "Systems of Today, Visions of Tomorrow," includes a paper by Amy Dykeman and Julia Zimmerman on the Georgia Institute of Technology electronic library, into which twelve commercial databases were loaded. An article by Pat Molholt and Kathy Forsythe charts the development of the campuswide information system at Rensselaer Polytechnic Institute, in which

commercial databases and campus files were included in the integrated catalog. Patrons may place holds and request interlibrary loans and photocopies from their own terminals.

While all the papers are interesting, they describe what is being done *now*. Not one of them goes beyond this to dream of a totally new approach to bibliographic information. What we can do now is impressive, but isn't someone, somewhere, dreaming of some new way to access and display information?—*Nancy B. Olson, Mankato State University.* ■■

Ensor, Pat. *CD-ROM Research Collections: An Evaluative Guide to Bibliographic and Full-Text CD-ROM Databases.* Westport, Conn., Meckler, 1991. 302p. $55 (ISBN: 0-88736-779-8).

In the ever-confusing maze of CD-ROMs, it is comforting to know that someone has been there first and has placed directional signs along the way. Whether you follow the markers' directions is up to you, but on the whole, this book will serve as a dependable guidebook full of valuable information and is a welcome addition to any collection where CD-ROMs are present.

In the foreword the author states that the databases covered were chosen for their usefulness for bibliographic research at the research level. In addition to bibliographic databases, the author reviews several full-text databases but no directories or numeric databases. The collection includes CD-ROMs that are updated periodically; selection criteria include scope and time-period coverage, geographic areas, and subjects covered. For each of the 114 CD-ROM databases listed in this guide, the author provides the following information: publisher, vendor, scope and content, reviews, equipment requirements, price, arrangement and control, search software and capabilities, other formats in which the database is available, and network licensing arrangements. The author identifies the basic elements of a useful format for evaluating a CD-ROM database, and the reader would be well served to follow a similar approach in evaluating more recent or other types of databases than are found in this book.

Of special interest and value are the scope and contents notes, which describe each database from several users' points of view (including the author's) and from publishers' brochures. When similar databases are reviewed, comparisons are made to assist readers with selection of appropriate CD-ROMs for their clients. Under the reviews notes, the author has cited many evaluative reviews from professional journals that are readily available in most libraries. Reviews of CD-ROM databases tend to be difficult to locate, and this book will provide the reader with excellent sources.

In addition to a title index, the book includes a subject index (with thirty-one subject headings), a publishers' and producers' index, and a listing of publishers' addresses. The subject index clearly indicates the extensive coverage of this guide. It comes as no surprise that most of the databases are found in the sciences. But other areas are well represented: education, law, music, books, and the social sciences. Not only are the major research subjects well covered, but a review of the fifty-two publishers listed shows international coverage, with 40 percent from outside the United States (the majority from the United Kingdom).

This volume is recommended for large academic, public, and research libraries that are acquiring or planning to acquire CD-ROM research databases.—*Jean-Paul Michaud, The New York Public Library.* ■■

Kessler, Jack. *Directory to Fulltext Online Resources 1992.* Westport, Conn: Meckler, 1992. 138p. paper, $30 (ISBN 0-88736-833-6).

The past five years have seen an explosion of information resources available over the Internet and via dial-up access. Publishers, Meckler in particular, have responded to this by producing a number of directories designed to assist consumers in exploring the variety of information available and in guiding them to access and acquire it. Unfortunately the nature of print publications defeats their usefulness to some extent: new data resources spring up almost daily, access procedures change, and by the time the edition appears in print the information is neither accurate nor comprehensive. What is really needed is a reliable online directory of resources, conscientiously maintained by a dedicated staff, to keep consumers fully up to date. A few volunteer efforts already exist, but until these

become commercially supported, beginners in the field and those lacking the time, energy, and resources to monitor the networks continually will need to rely on guides such as this one to keep abreast of new developments. This directory is planned as a series, so its information is unlikely to become too badly out of date. The author recognizes the problem and, to his credit, devotes more space to directing users to the existing online directories, which will be more up to date than the printed text, than to printing actual lists of data resources. Fortunately, the author provides such excellent introductory essays and philosophical treatises—such as "Information Overload" and "Taming the Nightmare and the Dream"—that the work becomes highly valuable as a general introduction to the field. In fact, the book might have been more aptly titled "An Introduction to Fulltext Online Resources." As an introduction it is excellent; as a directory it is slightly misleading, and Kessler would have done well to advise his readers constantly of the continuous state of change in online texts.

Kessler defines *fulltext online resources* broadly and covers a tremendous amount of territory, devoting a chapter each to commercial services, CD-ROMs, OPACs, bulletin board systems, interest groups, electronic conferences, electronic journals, and electronic libraries (i.e., repositories of electronic texts). The chapter introductions are followed by explicit directions to sources of full-text resources, complete with voice phone numbers, fax numbers, dial-up phone numbers, and Internet addresses. Many chapters contain extensive bibliographies referencing summary articles, background material, and printed and online directories; and the book itself concludes with a comprehensive bibliography. Where appropriate, instructions for obtaining online directories are given. For the topics in which he is most interested, Kessler provides extensive printouts of actual online sessions. Other topics, such as CD-ROM and commercial services, are given more cursory treatment.

The text takes a rather Californian point of view. A disproportionate number of quotes and examples are taken from California librarians and systems (notably the MELVYL system), and the directions for accessing the full text of Shakespeare's plays instruct the user to first connect to the MELVYL system and then hop to the Dartmouth College Library system, rather than simply giving the Internet address of the Dartmouth system! Standards in general could have been given more attention, particularly the incompatibilities between VT100 and TN3270 terminal emulation, which cause endless problems in access to and delivery of electronic text from PCs.

Kessler's professed goal is to introduce and inspire those who are less informed about the wonders of electronic full text, and in this he will undoubtedly succeed. The directory will not benefit those who are already Internet aficionados, but those who lack an Internet connection and those who want to become involved in electronic texts will be rewarded, as long as they bear in mind that the information presented in this book is in a constant state of change.—*Katharina Klemperer, Dartmouth College Library.* ■■

Library LANs: Case Studies in Practice and Application. Ed. by Marshall Breeding. Westport, Conn.: Meckler, 1992. 403p. $42.50 (ISBN 0-88736-786-0).

Local area networks (LANs) are fast becoming an accepted, and in fact expected, component of library operations. *Library LANs* will help you sort through a maze of networking options if you haven't begun the process. If you have a LAN in operation, this book can help you evaluate what you've got and perhaps inspire you to add new features. In the first chapter, Breeding offers an explanation of each component of a typical LAN as well as an overview of broader networking concepts, such as the server-based model, the peer-to-peer model, and the open systems interconnect model. Technical terms are defined in relation to library applications, so novices shouldn't feel overwhelmed if this is the first book read about networking. Simple diagrams of network topologies and a brief bibliography complete the introductory chapter.

The case studies are divided into four groups: Macintosh networks; networks specifically designed for CD-ROM; small, general-purpose networks; and large, multipurpose networks. A variety of library types is included: medical, fine arts, general undergraduate, and a large federal agency, to name a few. Novell, LANtastic, Banyan, and AppleTalk are some of the network operating

systems described. Each study includes some description of the library and campus environment, usually with an explanation of why a particular network operating system or protocol was selected. An interesting side benefit is the presentation of the variety of campus computing environments and the role of libraries in campus networking development. For example, in some situations the library drives development, while in others, the library is offered limited options based on existing campus standards. Several of the studies list what could have been done better and plans for the future. Access for disabled patrons is mentioned in one case study. Several popular library management systems are mentioned, as well as a raft of CD-ROM databases. Many diagrams are found throughout the case studies, and several include bibliographies and price lists. A vendor list and thorough index complete the book. While the price lists and specific model information become outdated quickly, this book will remain useful for some time. This may not be the only networking manual needed in your library, but it will certainly make a valuable addition to your networking collection.—*Janet Woody, Virginia Commonwealth University.* ■■

Mandelbaum, Jane B. *Small Project Automation for Libraries and Information Centers.* Westport, Conn.: Meckler, 1992. 341p. $42.50 (ISBN 0-88736-731-3).

The size of the automation project rather than the type of library or size of computer is the determining factor for inclusion in this endeavor by Jane B. Mandelbaum. Although the term small is subjective, the author covers a potpourri of automation projects that run from public computing, remote database searching, CD-ROM workstations, and administrative function automation to local area networks, with a final chapter on integrated automated library systems.

The initial four chapters give advice on planning and evaluating software that will be helpful to any librarian, especially those unfamiliar with software. The balance of the book presents an individual project in each chapter with a review of the options, points to consider, and a sample plan and checklist. The reader may choose a chapter of interest and need not read the others—each is complete within itself. The material in each chapter is basic and will benefit many librarians with limited computer literacy. A bibliography and resource list is divided by chapter and provides the reader with the materials necessary to carry out the suggestions in each chapter.

Although the author includes a chapter on integrated library systems, she deems this a "big" project, and one should be cautioned that the information in this chapter is incomplete and selective. This applies as well to the chapter on local area networks.

This book can be used as a guide—a starting place—for PC-based projects and will have value for some small libraries. Others will find the need for many of the projects (in this age of continued sophistication of integrated systems) questionable.—*Mary H. Casey, Information Systems Consultants, Inc.* ■■

Opportunities for Reference Services: The Bright Side of Reference Services in the 1990s. Ed. by Bill Katz. New York: Haworth, 1991. 213p. $29.95 (ISBN 1-56024-137-3). Also published as *The Reference Librarian*, no. 33 (1991).

This collection of eighteen articles covers a wide spectrum of topics relating to the interests of reference librarians, with themes that range from the philosophical to the practical. Like other volumes in this series, this compilation works best when viewed and treated as a journal issue; in spite of being bound within one cover, there is really no relationship between the various articles, except a very ephemeral one to the whole concept of reference librarianship.

The collection is divided into three general areas: Reference Librarians at Work; Tools of the Profession; and The Public Served. Articles include such diverse topics as the successful use of volunteers for a special collections project in an academic library; development of an increasingly collegial staff atmosphere in a medium-sized academic reference department; use of the telephone for successful and creative reference work; and some good reasons to incorporate legal materials (and instruction in their use) into all types of libraries.

Unfortunately, very few of the articles emphasize aspects of technology in librarianship, in spite of its pervasiveness in libraries of the 1990s. James Rice's article comes the closest: In his "The Evolution of Early Visions: An

Historical Perspective on Today's Information Technology," Rice relates the visions of Watson Davis and Vannevar Bush and discusses them in terms of the currently developing world information network. Other authors offer great detail about specific topics, such as an experience at California State Library with the Library of Congress' 1989–90 ROLLUP (Remote Online Library User Pilot) Project and the diversity of online and print resources in the interdisciplinary fields of health, physical education, and recreation.

The writing skills of the various contributors are uneven, and several articles contained grammatical errors that should have been caught in the editing process. This is not an essential purchase, particularly since the individual articles are indexed in the professional literature and those of interest can be retrieved topically.—*Linda Friend, Pennsylvania State University Libraries.* ■■

Schuyler, Michael. *Dial In 1992: An Annual Guide to Online Public Access Catalogs.* Westport, Conn.: Meckler, 1992. 292p. paper, $55 (ISBN 0-88736-808-5).

Libraries are reaching out via telecommunications at an unparalleled rate. The decrease in the cost of moderate- to high-speed modems, coupled with the availability of dial-in ports on the majority of new and upgraded automated systems, has made dialing out and dialing in much more affordable. Librarians are now quite comfortable letting their electronic fingers do the walking (and talking). A librarian with a PC and a modem can dial into virtually hundreds of OPACs across the country. And if the institution is fortunate enough to have access, "surfing the Internet" is an attractive option. This has tremendous implications for improving public services and even internal library operations. It is now possible to scan a library's holdings, test the user interface of different automation vendors, verify cataloging, and even access non-bibliographic databases such as community information files, thanks to digital wizardry. But until the Z39.50 communications standard is fully implemented by system vendors, the "dial-in-and swim" mode will be the mainstay for most libraries. To take such a plunge, a reliable map is needed.

Dial In 1992 is what used to be called a *vade mecum*—an indispensable guide to have at your side when you step out into the brave new world of electronic access. As its subtitle proclaims, it is an "annual guide to online public access catalogs," created by Michael Schuyler, who works at the Kitsap Regional Library in Bremerton, Washington. He writes a regular column, "The Systems Librarian & Automation Review," for *Computers in Libraries.*

To create the first (1991) edition, Schuyler mailed 15,000 questionnaires to libraries in the United States and Canada. More than 150 libraries were represented in that edition, ranging from huge academic institutions with millions of volumes to small public library collections. In the 1992 edition, that number has increased to over 250 respondents.

Basic data gleaned from the questionnaire are provided for each library:

- The number of volumes and titles held, and whether serials holdings are online;
- Names of contact persons for policy and technical questions with appropriate phone numbers;
- Bibliographic network affiliations and holdings symbol, if any;
- Up to three dial-in numbers, with necessary telecommunications parameters and baud rates;
- Notes on the system type (vendor) and name, if applicable;
- Terminal emulation (usually VT100);
- Operating hours (if not on a twenty-four-hour basis);
- An Internet address when applicable;
- Special technical or policy requirements; and
- Brief instructions for logging into and out of the system.

Each responding institution is given a full page to itself, with the data displayed in a clearly laid out tabular format, using a large, easily-read typeface. Libraries are listed by state and alphabetically within state. Three comprehensive indexes provide access by type of system (vendor), by area code, and by keywords within each library's name.

In the 1991 edition, Schuyler provided an excellent forty-page introduction to the ins and outs of telecommunications and, specifically, dialing into and out of an actual system, with Kitsap Regional Library's GEAC "Deep Thought" system as an example. In the 1992 edition, Schuyler devotes only three pages to getting online. But this is followed by a

twenty-four-page reprint drawn from the author's column in the September and October 1991 *Computers in Libraries* concerning the present and future state of "getting online." This essay revolves about the potential for electronic bulletin board systems (BBS) in the information continuum, since they are a logical extension to the OPAC universe. It includes a fascinating account of Schuyler's own attempt to mount a successful BBS, as well as the challenge (and opportunity) for libraries posed by the FreeNet BBS experience at Case Western Reserve University in Cleveland.

Any work that rests upon responses to questionnaires is hostage to the quality and completeness of the data submitted. It is obvious that some libraries provided minimal data. Many libraries represented in the 1991 edition have not provided updated holdings information for the 1992 edition. Now that dial-out and dial-in capabilities are almost universal for new and upgraded library automated systems, it will be interesting to see how many libraries will answer Michael Schuyler's questionnaire for the 1993 edition.—*Gerald M. Furi, Farmington Community Library, Farmington Hills, Michigan.* ■■

Williams, Brian. *Directory of Computer Conferencing in Libraries*. Westport, Conn.: Meckler, 1992. 429p. $59 (ISBN 0-88736-771-2).

The stated goals of this book are to "provide an introduction to computer conferencing for the uninitiated; provide data for a comparison of computer conferencing software and services; provide some basic general information on accessing systems via various networks; [and] provide a basic set of resources that can be used to obtain more information."

The first two chapters provide a brief introduction to conferencing. Computer conferencing is defined as "communication between people that is input through remote terminals or microcomputers to a central computer where the information is organized and distributed to the participants" (p.6) and is placed at the end of a continuum of computer-based communication that extends through e-mail and bulletin boards. The author lists features that one might find in a conferencing system and some possible applications for conferencing. In the three chapters at the heart of the book he describes eight different software products that support conferencing (e.g., Caucus and Confer), fourteen different conferencing systems (e.g., Echo and the WELL), and six networks through which one might access a conferencing system (e.g., BITNET and CompuServe). The sixth and final chapter lists names and addresses of "parties involved with computer conferencing." The remaining 231 pages are taken up by eight appendixes and a lengthy bibliography.

While there is quite a bit of useful information here, the overall utility of the volume is impaired by the lack of any substantial analysis or synthesis. The author quite literally provides data for a comparison of systems and services, rather than the comparison itself.

The section on system software, for example, neither summarizes these products in terms of the author's own list of features nor analyzes the significant differences between them. Instead, it attempts to describe the software by reproducing help screens and long lists of command words (read, enter, browse, etc.). Similarly, the section on conferencing systems consists mainly of sample log-ins, help screens, and conference topics.

The presentation of information also tends to be confusing. Many sections of downloaded text are offered without introduction or justification. For example, something entitled "NIXPUB Long List" simply appears as an appendix with not a word of explanation. An uninitiated reader might not realize that this is actually a very handy list of public UNIX-based systems offering dial users access to various networks and conferences. Other appendixes are less useful, or seem to have little to do with computer conferencing (for example, a list of anonymous FTP sites or the Art St. George list of "Internet-Accessible Catalogs").

The volume would have benefitted from an index, as well as from more rigorous editing for typographical and grammatical errors. The title is also a mystery, as apart from the "Internet-Accessible Catalogs" list and some text from PACS-L, the directory is not particularly library-oriented. Overall, an optional purchase.—*Priscilla Caplan, Harvard University Library.* ■■

World Information Technology Manual. Vols. 1 and 2. Ed. by A. E. Cawkel. Amsterdam: Elsevier, 1991. $165 (ISBN 0-444-87488-7 and 0-444-89313-X).

World Information Technology Manual, volumes 1 and 2, comprise more than 1,000 densely printed pages of text on a wide variety of technical, social, political, and managerial topics related to information technology—a subject the editor fails to define in the preface, but which appears to include almost any technology for storing, transmitting, or retrieving data or images.

Volume 1 contains seventeen chapters on information systems, with the emphasis on basics of the technologies: storage, input/output devices, fiber optics, satellites, man-machine interfaces, etc. Volume 2 contains twenty-six chapters on applied technology and social and political issues.

The editor's stated intent is to offer a comprehensive reference book that facilitates access to information about a large number of areas of information technology that lie outside the reader's own area of expertise. He also seeks to achieve a "tutorial jargon-free style." The mass of information included assures comprehensiveness and the relative lack of jargon assures understanding, but the style is incredibly boring. No one should have to read more than one of the forty-three chapters in a single sitting.

The editor jumps into each topic without a single paragraph of introduction or transition from the previous topic. The first page of text begins with a paragraph headed "Numbering systems" and goes directly into a detailed description of binary numbers without any explanation of why it is relevant. Presumably the reader decided to look up binary numbers in the index and already knew how they are relevant. Chapter 3 stands out because it has a brief introductory section that relates the content of the chapter to that of several others.

The sheer mass of information makes compiling the work a multiyear effort; thus it is not surprising that some of the information is out of date. In many of the chapters the most recent year referred to is 1989. Among the unfortunate results is a statement such as "RISC chips . . . are primarily designed for use in workstations with the UNIX operating system . . . CAD is the major workstation application . . . ." The widespread use of RISC-based workstations in library and information systems is not mentioned because it is a phenomenon of the past eighteen months.

Given the fact that the editor is British, it is understandable that the emphasis is on British and European developments, but some issues of concern to U.S. readers are treated all too briefly. For example, TCP/IP, the set of protocols most widely used to link computer systems in the United States, is limited to twelve lines.

There are a number of illustrations, but they are generally of poor quality. Particularly unfortunate in chapter 5 is a comparison of two resolutions. Both are of such poor quality that it is difficult to tell which is intended to be the 300 dpi (dots per inch) and which the 200 dpi.

There are lengthy bibliographies following each of the chapters, but there are few titles more recent than 1989. A random sampling of eight chapters determined that only 7.5 percent of the listings were published after 1989.

Given the massive amount of data contained in the two volumes, the quality of the index is particularly important. Unfortunately, it is far too limited. Of twenty-five terms sought in the index, only two were found. A typical example is "vertical blanking interval," the blank lines between TV frames. A number of teletext services use this "spare line," as the British call it, to transmit data via a conventional television signal to a set equipped with a special decoder. Neither the U.S. nor the British term was in the index, although the description of the topic was first-rate. Interfacing and interfaces—a major concern in information systems, and in computing generally—also did not make it into the index, although "interface, man-machine" did.

Overall, the book is disappointing in virtually every respect: a poor job of bookmaking, out-of-date information, and a very limited index, yet there is no other title that brings together so much information in one place. A library or information specialist requiring a comprehensive reference collection on information technology should make the investment, but most may want to rely on more current journal articles retrievable through a high-quality index—printed, online, or on CD-ROM.—*Richard W. Boss, Information Systems Consultants Inc.* ■■

Software Reviews

MKS Toolkit: UNIX Tools on a PC. Mortice Kern Systems Inc., 35 King St. North, Waterloo, Ontario, Canada N2J 2W9; information: (519) 884-2251; orders: 1-800-265-2797. Price: DOS version, $249 for a single-user license. System requirements: PC with 8088 processor or faster, 256K RAM, DOS 2.1 or OS/2 1.2 or higher; hard disk with 2–4.5 MB free space, depending on options chosen upon installation.

MKS Toolkit is a package of more than 160 utilities that provides DOS-based computers with UNIX capabilities. Not only does Toolkit include UNIX utilities like *more, grep, cat, sort, alias,* and *sed,* but the package also provides a programmable UNIX shell (specifically, the Korn Shell) and a programming language, *awk*, designed for handling text. MKS Toolkit does not replace DOS with a UNIX-like operating system; rather it provides a UNIX shell on top of DOS. MKS Toolkit also will not turn a PC into a UNIX-like multitasking and multiuser workstation.

MKS Toolkit is relatively easy to install; the installation manual gives detailed instructions for both automated and manual installation. The latter option allows the user to go through a list of Toolkit's utilities and choose which ones to load. On a 286 PC, automatic installation took under fifteen minutes; however, this fast installation was the result of opting not to take several minutes to install the spell checker or to run a program that checks all the MKS Toolkit commands against the available DOS commands and warns the user of potential confusion resulting from identical command expressions—a ten-minute procedure on the reviewer's 286. The installation manual also treats the various configuration options. The user may choose from options that range from having some Toolkit commands available at the DOS C: prompt to running the UNIX Korn Shell as the default shell, with login and password required after bootup.

DOCUMENTATION

In addition to the installation manual, documentation includes a *User's Guide,* which gives tutorials on the vi screen editor, programming the Korn Shell, and using the programming language *awk* to manipulate text files and generate reports. Commands are also treated in summary fashion in the *User's Guide*. The *Reference Manual* provides detailed information about each utility. It lists all the options available with each utility, examples of usage, related environment variables and commands, and variations found with different versions of UNIX. As Mortice Kern Systems has attempted to make Toolkit compliant with POSIX, an evolving international standard for UNIX systems, the *Reference Guide* lists the status of the utilities' conformance to this set of standards. The information provided in the *Reference Guide* is essentially identical to that provided in the online manual. The reviewer found the print reference faster and easier to use than the online version.

The utilities *grep, egrep,* and *fgrep* can be used to search terms or expressions across a file, multiple files, directories, or entire disks. The three closely related utilities have identical options, allowing a wide range of search strategies and output formats. Combining the grep family of utilities with other Toolkit commands into one shell program (see below) allows one to develop customized information-retrieval programs.

MKS Toolkit includes two file-compression utilities: *compress* and *pack*. These tools are useful in compacting directories and files, especially those files and directories not used regularly. Each of the tools has a corresponding decompression technique: *uncompress* and *unpack*. *Compress* tends to achieve a higher level of compression than *pack*. Testing *compress* on a 66K directory containing seven text files, the resulting compressed directory was only 34K in size, occupying 48 percent less disk space. When tested on the same 66K directory, *pack* resulted in a compressed directory size of 40K, yielding 39 percent compression. Testing on several other directories and files also showed that the *compress* tool yields a greater compression rate.

Using a compression tool to compact files on a workstation to which other staff or the public might have access is one way to achieve a modicum of security for files you do not wish others to access. A more effective way to bar access to sensitive files is to use the *crypt* encoding tool. When issuing a *crypt* command the user must supply a text string that will serve as the encryption key. To break into this file, an individual would have to know

```
                    SELECT SECURITY PROFILE FOR UPDATE                LSCU02

      UNIT                                                Operator
No.   T ID   Last Name..... First Name..... MI           I.D.
 1.   C FS   XUZeOn Pres    Bindery Prep                 OUI
 2.   C MN
 3.   C ST
 4.   P UL
 5.   S PV
 6.   C FS   XZZeTh Pres    Conservation                 OAZ
 7.   C MN
 8.   C ST
 9.   P UL
10.   S PV
11.   C FS   XGZeOn Buhr    Staff Terminal A             OGE
12.   C MN
13.   C ST
14.   P UL
15.   S BU
16.   C FS   XFZeZe Buhr    Staff Terminal B             OFO
....continued from prior screen          continued on next screen....

Select number to update:
CLEAR=EXIT  PF1=HELP  PF3=BACK  PF4=RETURN  PF7=BACKWARD
PF8=FORWARD
```

Figure 1. Select Security Profile for Update.

that it is encrypted and know the encryption key.

REPORT GENERATION

Barring people from files does not constitute the primary value of MKS Toolkit, however; rather, its programmable file- and text-handling capabilities are what make Toolkit an extraordinary addition to any PC. Figure 1 represents a screen from the security tables in the University of Michigan Library's online system MIRLYN.[1] Without going into too much detail, suffice it to say that the library's integrated online system has very poor reporting capabilities, and as a result, the staff user gets the tables in the form displayed in figure 1 with no alternative display options. The staff who work with these tables often need to access the tables by operator I.D., whereas the table is sorted by last name. Another inconvenience resulting from the inflexibility of the system software is that it does not allow for the entry of the user I.D. in the last name field in its true alphanumeric format (e.g., XU01 instead of XUZeOn). The project, which involved MKS Toolkit, had several goals:

- to strip out unnecessary lines such as blank lines and command lines appearing on the screen,
- to translate the entirely alphabetic user I.D. into its true alphanumeric form, and
- to sort the table by operator ID.

The stripping of the table and the conversion of the alphabetic user I.D.s were done with the stream editor *sed*, using the script shown in figure 2. Generally speaking, one enters a text pattern into a *sed* script, and *sed* matches on this pattern in the target file and performs the operations the user has indicated.[2]

The next step was to generate a display of the table sorted by operator I.D. using the *awk* reporting and text-handling language. *Awk* has its roots in the C programming language, but it has been designed specifically to handle textual data.[3] *Awk* assumes every text file is a database file with fields. The user can

"Stripper" sed script

```
/^ *SELECT/d
/^ *UNIT *Operator$/d
/^ *No. *T ID.*/d
/^.*continued on next screen\.\.\.\.$/d
/Select number to update: *$/d
/CLEAR=EXIT/d
s/^ *[0-9][0-9]*\.  *//
/\*\*\*/d
/^$/d
s/Ze/0/g
s/On/1/g
s/Tw/2/g
s/Th/3/g
s/Fo/4/g
s/Fi/5/g
s/Si/6/g
s/Se/7/g
s/Ei/8/g
s/Ni/9/g
```

Figure 2. "Stripper" Sed Script.

"reptoids" awk program

```
BEGIN {FS = "   *"; OFS = "; "}
{
if ( $2 ~ /[:alpha:]+/ ) print "              "$4," "$2," "$3"
}
```

Figure 3. "Reptoids" Awk Program.

"miroids" shell script

```
#!/bin/sh
sed -f stripper /jb/mirsec |  awk -f reptoids | sort -u -t";" > /jb/oidsort
```

Figure 4. "Miroids" Shell Script.

set the field separator in the BEGIN statement of a program. The short *awk* program shown in figure 3 will generate a version of the table in which the operator I.D. is displayed as the first data element. The output of the *awk* program is then piped through the *sort* command to sort by the operator I.D., with the resulting table appearing as:

- OAZ; XZ03 Pres; Conservation;
- OFO; XF00 Buhr; Staff Terminal B;
- OGE; XG01 Buhr; Staff Terminal A;
- OUI; XU01 Pres; Bindery Prep;

Figure 4 shows the Korn Shell program used to pull the *sed* script, the *awk* program, and the *sort* command together. The program shown in figure 4 directs the file containing the text shown in figure 1 first through the "stripper" *sed* script, next through the *awk* program "reptoid," then through the *sort* command, and finally into a file for storage.[4] Using the Korn Shell, one can combine commands in a sequence for execution from the shell with a single command (e.g., the command "miroid" will set off the chain of commands listed in figure 4). With positional parameters one can also enter a Korn Shell command and supply variable values on the command line, and the variable values will pass from the command line to the program for execution. Though the *awk* and Korn Shell programs shown in this review are quite short, they are very powerful.

CONCLUSION

MKS Toolkit can be recommended highly to all libraries. It can turn even an old PC into a flexible and powerful workstation, and this capability is especially beneficial in these times of shrinking budgets, when libraries find it difficult to replace their existing hardware with machines sporting the latest chip and the flashiest features. If the user is not familiar with UNIX, it does take some time to learn some of the utilities, especially *awk* and Korn Shell programming, but the benefits are worth the learning time. Libraries using UNIX may find it desirable to do some processing and programming on the PC with MKS Toolkit and then load the resulting files to a UNIX workstation. Libraries migrating to UNIX—as so many are—will find that staff can get a head start in learning the system by installing MKS ToolKit on their IBM compatibles. —*Brian Sealy, University of Michigan, Ann Arbor.*

REFERENCES AND NOTES

1. All User I.D.s and Operator I.D.s given in the sample screen in figure 1 are fictitious.
2. For an excellent manual on *sed*, see Dale Dougherty, *sed & awk* (Sebastopol, Calif.: O'Reilly & Associates, 1991).
3. The MKS *User's Guide* included with the software includes a good introduction to *awk*. See also Dougherty (1991) cited above for a more thorough treatment.
4. Naturally, the complete table altered by this program was much longer than the sample shown in figure 1. ■■

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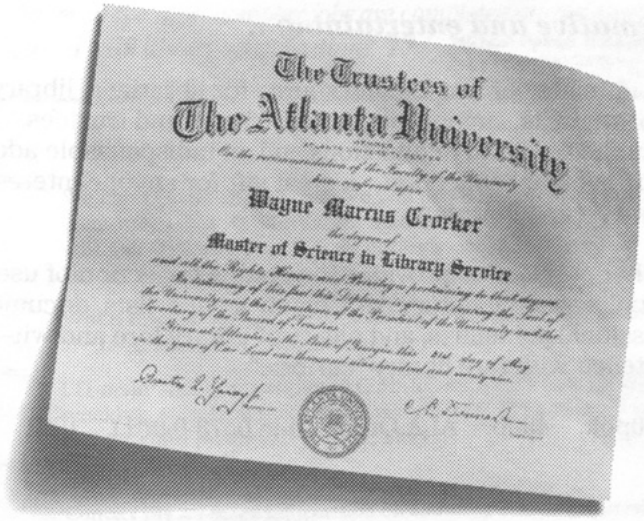

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