INTERNET-ACCESSIBLE INFORMATION RESOURCES

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Contents

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The Internet is one of the first manifestations of the revolution being brought about by the merger of telecommunications and computing. Its promise has captured the collective imagination of information professionals. This selected bibliography explores the literature about Internet-accessible information resources. Begun as a project focusing on online public access catalogs (OPACs), the effort was expanded to include information on other materials available via the "Telnet" command. Related capabilities such as BITNET discussion groups and file transfer protocol are also covered in some of the abstracts, since information on several functionalities is frequently included in the same article.

The bibliography is divided into four subject areas: OPACs, guides and directories, technological aspects, and other information resources. Books and periodical articles are included. Book reviews and announcements of new products or services were considered out of scope. In each subject area, resources are arranged in reverse year order, and further alphabetized by author within each year grouping.

As befits a new technology, the literature to date emphasizes what it is possible to do rather than what is being done. Future literature searches will undoubtedly show an increasing number of articles on how Internet resources are being used.

This is a beginning effort to provide bibliographic control for a literature that is expanding rapidly. Readers who know of corrections or additions are invited to contact the compilers.

*** 6.1 ***
Brandt, D. Scott. "Providing Internet Access to Additional OPACs." *Academic and Library Computing* 9:2 (February 1992): 7-9.

Brandt discusses a variety of issues that should be addressed by academic libraries before providing Internet access to OPACs for their patrons. He divides these issues into four categories: current service commitments, expectations and impacts of access, support responsibilities, and future planning.

In the first category, Brandt suggests that as libraries move from attempting to own materials to a stance of providing access to them, they need additional tools for identifying and finding requested materials. Remote OPACs can help with this process. They can also be used for verification of citations, for provision of more sophisticated searching techniques than may be available on the local OPAC, and for resource sharing.

Libraries that do provide this service should be prepared for users demanding more library services. Users who find that an item is available at a remote location might assume that a resource-sharing agreement exists with the remote library. Libraries should be prepared to assist users in getting at these materials, through either direct access, accelerated loans, or traditional interlibrary loans. Also, as users become familiar with Internet resources and with remote OPACs, they may come to expect that their local systems will soon have advanced search capabilities or additional databases.

Responsibilities for support must be defined in advance. Decisions will need to be made about what kinds of hardware and software will be used and who will maintain them. Software should be selected that is easy to use and that has security and downloading features. Training should be provided for users, either online, in print, or through classes. The training may involve how to connect to the Internet as well as how to search specific OPACs.

Planning for the future may include cooperation between the library and the campus computing center, as well as determining what types of services the library will support in the future.

*** 6.2 ***
Barron, Billy. "Another Use of the Internet: Libraries' Online Catalogs." *ConneXions* 5:7 (July 1991): 15-19.

After listing possible uses of Internet-accessible OPACs, Barron discusses the difficulties they present. Besides the problem of needing to learn different search strategies for each library system, users may also encounter problems when their local mainframe and the remote library system are incompatible. An IBM mainframe using the TCP/IP package FAL cannot access library systems requiring a VT100 terminal. Likewise, mainframes that do not have TN3270 cannot connect to library systems using IBM mainframes.

Barron discusses "milking machines," connecting hardware such as terminal servers and protocol converters in such a way as to get around the VT100/TN3270 emulation problem. Future changes involving the Internet that are likely to affect OPAC access include implementation of NISO Z39.50 and the adoption of a graphical user interface based on the X Windows system.

Finally, various documents and software resources to assist users are described.

*** 6.3 ***
Engel, Genevieve. "User Instruction for Access to Catalogs and Databases on the Internet." *Cataloging and Classification Quarterly* 13:3/4 (1991): 141-156.

Engel discusses access and use of remote OPACs from the perspective of user instruction. Using an OPAC presents problems for remote users who may have no experience using unfamiliar commands and search strategies, and who do not have any resources for assistance. Engel identifies the points where users are most likely to need help and offers suggestions for teaching patrons how to make the most of these remote resources.

Logging on to a remote OPAC can be problematic, since the procedures vary greatly from system to system. Reading welcome screens may be critical in selecting the right database, or understanding search commands. Welcome screens designed specifically for the remote user could help describe the various databases available. Remote users also need to understand that certain databases may be available only to local users. Patrons may be confused by password requirements, and the need to distinguish between local passwords for their "home" system and passwords requested by the remote system.

Educating users about remote OPACS means informing them of the differences between systems. Most catalogs can be searched using either menus or commands, or, in some cases, both. The catalogs of a given vendor are usually similar in the ways they can be searched, but there is variation here, too. Basic explanations of searching, indexes, search terms, and displays should appear on help screens to assist the novice remote searcher.

Variations in the format for search terms, as well as variations in the authority records, provide obstacles to the remote user. For example, a search for John Smith in one catalog may retrieve works by authors

John and Smith, while retrieving works by John Smith, but not John Q. Smith, in another.

Librarians can benefit from directing patrons to other systems. By introducing local patrons to remote OPACs, librarians can engender an appreciation for the local system and show how a catalog can be tailored to a different user community. Encountering remote OPACs can also provoke patron suggestions for improving the local system once the special features of other systems have been sampled.

*** 6.4 ***

Engle, Mary E. "Electronic Paths to Resource Sharing: Widening Opportunities through the Internet." *Reference Services Review* 19:4 (Winter 1991): 7-12, 62.

Over 200 online library systems in eight countries and on every continent except Antarctica are connected to the Internet, and the number is increasing. Access to remote OPACs is useful to librarians for: 1) evaluating command structures and display screens; 2) expanding available reference tools; 3) obtaining factual information; 4) expanding bibliographies; 5) verifying citations and call numbers; 6) providing additional access points; 7) helping researchers to prepare for trips to other collections; 8) transcribing bibliographic records for such purposes as entry into microcomputer-based databases; 9) encouraging free, open access to information; and 10) developing an intuitive sense for the behavior of online systems.

Users of the University of California's MELVYL online catalog can access over 30 remote OPACs via a special USE command. Statistics indicate that providing such access is manageable; incoming sessions from non-UC users represent approximately four percent and outgoing USE command attempts approximately three percent of system use. Current statistics may be viewed from inside MELVYL by typing "show internet stats" and "show system stats."

Possible problems are: 1) methods of accessing online catalogs vary greatly; 2) some hardware is not adequate for networking; 3) users may have to break the Telnet connection or reboot to exit; 4) access methods may vary from database to database within the same OPAC; 5) librarians may not be well versed in searching widely varying systems; 6) online help screens and error messages may be less than helpful; 7) special collections that are merged with the library's main collection are difficult to identify; 8) license agreements may prohibit remote access to commercially produced databases; 9) distinguishing between databases limited to local holdings and more comprehensive databases may be difficult; 10) such related entities as article databases and journal holdings may not be linked; 11) materials found in remote databases may be difficult to obtain; and 12) troubleshooting is challenging.

Although Internet access "may be only for the adventuresome" at this stage, the user can improve the experience by: 1) logging on between 6 p.m. and 9 a.m. Eastern time; 2) using VT100 and TN3270 terminal emulations; 3) using "generic" terminal type when printing or downloading; 4) learning Telnet software commands; 5) examining online help facilities; 6) looking for a system's logoff command on logon screens; 7) if exiting problems arise, trying LOGOFF, CLOSE, or, as a last resort, ABORT; 8) trying LIBRARY, CATALOG, or GUEST as passwords; 9) remembering that function keys are irrelevant in a remote session; 10) using known item searches to get familiar with a system; 11) remembering that older items may not be online; and 12) educating vendors on the needs of the networked environment.

Standards such as the Z39.50 protocol and ISO 10162/10163 may dramatically advance interoperability between systems.

*** 6.5 ***

Sapon-White, Richard E. "Cataloging Using Internet-Accessible Library Catalogs." *Technicalities* 11:10 (October 1991): 7-8.

Sapon-White discusses the use of the Internet to solve cataloging problems. He shares two successful examples from his own experience, one in which he found a call number and subject headings for a 10-year old thesis that was not cataloged in OCLC and one in which he found a transliterated Japanese title and explanatory note that were not included in the OCLC record. He admits, though, that he has made many unsuccessful searches for cataloging data. Even when useful cataloging information exists on the Internet, terminal incompatibility and interrupted sessions may make the information difficult or impossible to access.

Some types of cataloging questions are better candidates than others. Searching the remote OPACs for recent publications that are likely to appear in the bibliographic utilities soon or for titles on narrow topics and published by noncommercial foreign publishers is probably not worthwhile. Knowing where on the Internet a title is likely to be increases the probability of a successful search; examples include searching the catalog of the degree-granting institution when cataloging a thesis, looking for older materials at libraries with special collections or subject strengths in the appropriate areas, and, when copy cataloging, looking at holdings on a utility to determine which libraries may have enhanced a record locally. Making a chart of holdings symbols of Internet-accessible catalogs can make determining likely libraries more efficient. With experience one will know which catalogs are most likely to successfully interface with one's own terminal.

Is using the Internet in this manner worthwhile? This is a good question, since logon problems and lack of data are probable. These difficulties may be mitigated as the searcher identifies catalogs that are compatible with his or her own terminal and that are most likely to have useful information. Sapon-White concludes that the Internet's usefulness as a cataloging tool, which is presently questionable, may increase in the future.

*** 6.6 ***

Bailey, Charles W. "Libraries with Glass Walls." *Public-Access Computer Systems Review* 1:2 (1990): 91-93.

In this editorial, Bailey describes the phenomenon that has been called the "library with glass walls." In such a library, it is possible to know what a library owns, but impossible for remote patrons to retrieve those materials. Bailey predicts that the interlibrary loan demands of remote users will increase as OPACs become accessible over the Internet. Libraries may have difficulty meeting these demands because of the rising costs of interlibrary loan and dwindling financial resources.

*** 6.7 ***

Birchfield, Marilee. *Casting a New Net: Searching Library Catalogs via the Internet*. ERIC Document 329-295. 1990.

Birchfield discusses searching library catalogs from the perspective of reference and bibliographic instruction librarians. After reviewing background information on the Internet and the reasons for searching remote catalogs, she identifies the stumbling blocks encountered in searching remote OPACs, as well as describing some strategies for overcoming them. These obstacles include: the diversity of commands and procedures found amongst OPACs; the lack of documentation, both in hard copy and online; the limited number of terminal emulations available on some systems; and restricted access to selected databases on a given system. Also, patrons may incorrectly expect all materials represented in a catalog to be obtainable through interlibrary loan.

Some of the steps Birchfield has taken to overcome these limitations include gathering documentation on local area catalogs, providing photocopies of this documentation to patrons for specific catalogs, and writing articles in the campus computing newsletter about using remote OPACs. Faculty outreach is also important in encouraging this kind of library research.

She also alerts users to be mindful of an OPAC's coverage of a library's collection. Knowing the dates covered by a catalog and the types of materials included in it can save the user valuable time and effort. It is also useful to know if other libraries' collections are included in an OPAC. Reading introductory and help screens is equally important, although these may be limited in some systems.

*** 6.8 ***

Drummond, Louis. "Going Beyond Online." *Online* 14 (September 1990): 6-8.

Drummond discusses three developments that are changing the nature of the online information environment: Internet-accessible catalogs and databases, computer conferencing, and electronic journals.

In regard to Internet-accessible resources, Drummond identifies six issues that will need to be addressed as the availability of hundreds of Internet-accessible resources changes the online searcher's role. These include: identifying who is responsible for assisting end-users; maintaining lists of institutions and their Internet addesses; making online systems user-friendly so that remote users can search them through the Internet without documentation; accepting direct interlibrary loan requests from remote users; providing access to locally-mounted proprietary databases; and charging fees for access to services via the Internet. Drummond states that these issues have only just begun to be addressed.

*** 6.9 ***

Raeder, Aggi W., and Karen L. Andrews. "Searching Library Catalogs on the Internet: A Survey." *Database Searcher* 6 (September 1990): 16-31.

Raeder and Andrews discuss how to use Internet-accessible OPACs, with emphasis on the hardware and software necessary to provide useful connections. They also describe a comparative survey of the forty-plus OPACs available to them at the time of their writing. They used the St. George directory for their list of OPACs.

Reasons for using remote catalogs are given, followed by a description of the Internet and how to go about connecting to it. They emphasize the need for a communications software package if one is to connect to the Internet via dial-up. Other topics covered include terminal emulation, use of the Telnet command, logging on and off, downloading, and requesting help from remote libraries.

For their survey, they searched for a standard set of common titles on remote OPACs. For each OPAC, they noted the ease of retrieving the titles, search indexes, separate databases of special materials, help screens, and holdings information for serials. This information is summarized in the article's appendix, which is organized by state, and within state alphabetically by school. Only libraries in the U.S. are included. The appendix gives the following information for each catalog: Telnet address, mailing address and phone number, electronic mail and/or phone number for help,

logon procedures, vendor, size of library, special features (such as whether circulation or holdings information is included), summary information on the results of the searches performed, and other comments.

*** 6.10 ***
Stone, Peter. *JANET: A Report on Its Use for Libraries*. British Library Research Paper 77. London: British Library Research and Development Department, 1990.

The Joint Academic Network (JANET), the academic network of the United Kingdom, is a private X.25 packet-switched network. It is managed by the Network Executive and funded by the Computer Board for the Universities and Research Councils. Inaugurated in 1984, JANET now links over 100 universities, polytechnics, research institutions, and others, including the British Library. Hosts in Europe, North America, and elsewhere can be reached via gateways to other networks such as EARN, BITNET, NSFNET, UUCP, and EAN. Electronic mail, file transfer, remote job submission, and terminal access are supported by the Coloured Book protocols, with a transition to Open System Interconnection expected. This report focuses on the information services available to the academic community through JANET. Topics discussed include the role of libraries, particularly the British Library, in providing these services.

Users are accessing commercial online services, many library OPACs, datasets, news, product information, and specialized computing services through JANET. Interlibrary loan requests are transmitted via ARTTEL and electronic mail. Libraries retrieve catalog records from BLAISE (British Library Automation Service). Software being developed will permit records from a remote database to be integrated into a user's own application.

This 138-page book includes a glossary of acronyms, a bibliography, and JANET addresses of 48 OPACs.

*** 6.11 ***
Welsch, Erwin K. "The Desk Chair Traveler." *OCLC Micro* 6:5 (October 1990): 40-42.

This article describes representative Internet voyages to the Colorado Association of Research Libraries (CARL) and the Cleveland Free-net from the author's home port at University of Wisconsin-Madison. Logon sequences and other commands are detailed. Screens and messages, including a sample bill estimate, are reproduced as illustrations. An unsuccessful attempt to connect to the catalog of the University of California at Berkeley and a challenging disconnect are also described.

*** 6.12 ***
Stone, Peter. "Remote Access to OPACs, and the Use of Electronic Mail, in University Libraries: Developments in the Use of the Joint Academic Network (JANET)." *Vine* 63 (August 1986): 28-30.

This brief report discusses a survey conducted for the Standing Conference of National and University Libraries (SCONUL) in Great Britain. Of 29 institutions reporting that they had OPACs, 15 responded that they were connected to JANET, the Internet backbone in Great Britain. Stone comments that this is "the beginnings of a trend towards 24-hour, networked, public, open catalogues with online circulation data."

Other services supported by JANET, including electronic mail, were rarely used by responding libraries. Stone speculates that either there are too few terminals in staff areas, or that libraries have not yet revised their workflow to accommodate these new resources.

Guides and Directories

*** 6.13 ***
Kehoe, Brendan P. *Zen and the Art of the Internet: A Beginner's Guide*. 2d ed. Englewood Cliffs, NJ: PTR Prentice Hall, 1993.

This manual introduces novices to much of what is currently available over the Internet. It tries to be operation-system "neutral," with little information given that is specific to a particular computer environment. The book has two purposes: to serve as a reference and to provide a foundation from which readers can explore the Internet. The focus on the new user is clear.

Topics covered include basic background, electronic mail, anonymous ftp, USENET, Telnet, commercial services, and organizations. Appendixes discuss reaching other networks, retrieving files via electronic mail, and news group creation. A glossary, bibliography, and index are included.

The first edition is available via ftp from host ftp.uu.net, directory inet/doc.

*** 6.14 ***
Barron, Billy. *UNT's Accessing Online Bibliographic Databases*. Denton, TX: University of North Texas, 1992. (Available via ftp from host ftp.unt.edu, directory library, file libraries.txt.)

Barron's directory complements that of St. George and Larsen. It lists over 350 library catalogs in 12 countries. For each it gives location, logon and logoff procedures, and a contact person. It also identifies the system vendor, such as GEAC or UTLAS. Appendixes for fifteen vendors' systems can be consulted for searching instructions. An index lists not only the

names of institutions, but also states, countries, and system vendors. This makes it relatively easy to find which OPACs are available for searching in Canada or Hawaii, or to find out who has a NOTIS or VTLS catalog on the Internet. There are also appendixes on accessing the Internet from JANET (Joint Academic Network in the U.K.), Telnet and TN3270 escape keys, and a brief bibliography.

The directory is available in text, WordPerfect, ASCII, and PostScript versions. It is updated on an irregular basis; at the time of this writing, the latest update was issued 8 June 1992.

*** 6.15 ***

Drew, Wilfred. *Not Just Cows: A Guide to Internet/BITNET Resources in Agriculture and Related Sciences*. Morrisville, NY: SUNY at Morrisville College of Agriculture and Technology, 1992. (Available via ftp from host ftp.sura.net, directory pub/nic, file agricultural.list.)

Drew has compiled this subject-specific guide to electronic information available over the Internet and BITNET. Included are logon and logoff instructions for over 40 agriculture libraries with Internet-accessible OPACs; bulletin boards with an agricultural orientation; and listserver discussion groups related to agriculture.

Four bulletin boards are included: the Advanced Technology Information Network at California State University, Fresno; Clemson University Forestry and Agricultural Network; PENpages at Pennsylvania State University; and CENET, the Cornell Cooperative Extension Network. Sample screens and menus are given for each of these, showing the wide variety of information available.

Also listed are agricultural almanac servers, which are used to distribute newsletters and news releases. The addresses and subscription instructions are given for ten such servers. Topics covered include sustainable agriculture, food market news, and national agriculture news.

*** 6.16 ***

Farley, Laine, ed. *Library Resources on the Internet: Strategies for Selection and Use*. RASD Occasional Papers, no. 12. Chicago: American Library Association, Reference and Adult Services Division, 1992. (Also available via ftp from host dla.ucop.edu, directory pub/internet, file libcat-guide.)

This guide is designed to give the reader a detailed overview of using the Internet to search library catalogs. To that end, the authors have addressed numerous aspects of this process. After some general background on the Internet, they discuss the reasons for searching remote OPACs. These include: using a remote OPAC to complement the capabilities of one's local OPAC; evaluating a remote collection using specialized remote databases such as a local newspaper index; and evaluating other integrated library systems. A listing of five directories of Internet-accessible OPACs describes the strengths and weaknesses of each. Techniques for selecting and searching catalogs are given in detail.

General logon and logoff procedures are discussed, as are the Telnet and ftp commands. Other topics covered include downloading and printing searches, using gateways, and discovering non-OPAC resources available on the Internet. Appendix B includes help screen instructions for six commonly encountered systems (DRA, DYNIX, GEAC, Innovative Interfaces, NOTIS, and VTLS).

*** 6.17 ***

Krol, Ed. *The Whole Internet User's Guide & Catalog*. Sebastopol, CA: O'Reilly & Assoc., 1992.

This is an easy-to-understand guide to all aspects of using the Internet. In addition to providing background information about the Internet's origins, management, and politics, it covers both the basics and advanced aspects of using Telnet, ftp, and electronic mail.

Perhaps most significant is a fifty-page chapter entitled "Resources on the Internet." Using such resource-finding software as Gopher, Archie, and WAIS (each of which is covered in its own chapter), Krol has compiled a directory of databases, software archives, and bulletin board systems organized by subject. Subjects run the gamut from "Aeronautics and Astronautics" to "Zymurgy." Each of the 58 subject categories has several entries; each entry describes the resource briefly and provides instructions for access.

*** 6.18 ***

National Science Foundation Network Service Center. *Internet Resource Guide*. Cambridge, MA: NSF Network Service Center. (Available via ftp from host nnsc.nsf.net, directory resource-guide)

The *Internet Resource Guide* is divided into seven chapters, each chapter being devoted to a different type of resource. These include computational resources, such as supercomputer centers; library catalogs; data archives, including Dartmouth's Dante Database; white pages; networks and electronic mail gateways; network information centers; and miscellaneous resources.

For each resource, the following information is given: postal and electronic addresses; phone number; a description of the resource; logon information; who can use the resource; and additional notes. In the latest update (November 1992), twenty-seven library catalogs are listed.

*** 6.19 ***

Noonan, Dana. *A Guide to Internet/BITNET*. Metronet, 1992. (Available via ftp from host hydra.uwo.ca, directory libsoft, files guide1.txt and guide2.txt.)

This guide is available as two separate files. The first file contains information on a wide variety of Internet resources and services. Noonan has compiled information on electronic mail, discussion lists, electronic journals, freenets, campuswide computing systems, Internet access to commercial databases, gateway programs, and other resources. Logon instructions and descriptions of these varied resources are given for each.

The second file is a compilation of the information in the St. George/Larsen, Barron, and HYTELNET directories of Internet-accessible OPACs. For each institution, logon and logoff instructions are given, as well as a description of special features, such as bibliographies or databases accessible through the OPAC. Organization is by country, then alphabetical by name of institution. About 250 libraries are included.

*** 6.20 ***

St. George, Art, and Ron Larsen. *Internet-Accessible Library Catalogs & Databases*. Albuquerque, NM: University of New Mexico, 1992. (Available by electronic mail; send message "get library package" to listserv@unmvm.bitnet.)

This directory lists over 200 online catalogs, dial-up libraries, campuswide information systems, bulletin board systems, and other online resources in the United States and nine other countries. The directory is organized first by type of catalog or database; for example, the first part consists of U.S. OPACs. Within each section, listings are by state or country, then alphabetical by institution. There is no index.

Information for individual OPACs varies but generally includes a brief description of the catalog's holdings, logon and logoff procedures, and the address of a contact person. The directory is updated on an irregular schedule; the latest edition at this writing is dated 6 January 1992.

*** 6.21 ***

Scott, Peter. *HYTELNET*. Saskatoon, Sask.: University of Saskatchewan, 1992. (Available via ftp from host access.usask.ca, directory pub/hytelnet/pc, file hyteln63,zip)

HYTELNET is a hypertext utility program that provides logon information about Internet-accessible library catalogs, freenets, bulletin board systems, and other resources. Versions are available for MS-DOS, Unix, and VMS systems. The OPAC information is taken from Barron's guide.

*** 6.22 ***

Henry, Marcia K., Linda Keenan, and Michael Reagan. *Search Sheets for OPACs on the Internet*. Westport, CT: Meckler, 1991.

This guide provides information on how to use the OPACs accessible over the Internet, modeled along the lines of the DIALOG Blue Sheets. For each of 25 systems, charts detail the commands and indexes for searching the catalogs, as well as logon and logoff procedures. Online holdings are summarized for each OPAC description.

Edited online help screens for the following seven OPACS are reproduced in Appendix B: CARL, Harvard, MELVYL, Ohio State, ILLINET Online, University of Kansas, and University of Wisconsin.

Several systems provide access to the catalogs of multiple institutions. For example, ILLINET Online is the online catalog for 34 academic libraries in Illinois as well as over 800 other libraries in the state. Library and geographic indexes can direct the user to the appropriate page for libraries not evident from the list of OPACs in the table of contents.

*** 6.23 ***

Kirby, Steven, comp. *Using Online Public Access Catalogs via the Internet: A Guide for the University of Georgia Libraries*. ERIC document 337170, 1991.

Although written specifically for the University of Georgia (UGA) Libraries, this guide has useful information for users at any site. The first section offers a brief description of accessing the Internet from a UGA computer. Each of the following ten sections describes a particular vendor's system. For each system, search and display commands are given with examples. Following this, logon and logoff instructions for individual catalogs using that system are presented. Additional information on specific OPACs is sometimes provided. For example, the description of Dartmouth's catalog includes instructions for using their full-text Bible database.

Two indexes provide useful information for the remote OPAC user. The first is an index of institutions covered in the guide. The second is an eight-page index of subject strengths and special OPAC features. The subject information was culled from the *American Library Directory*. For example, if a user was looking for Southeast Asian materials, the index shows that Northern Illinois and Cornell have Southeast Asia studies collections.

*** 6.24 ***

Martin, Jerry. There's Gold in Them Thar Networks, or, Searching for Treasure in All the Wrong Places. December 1991. (Available via ftp from host nis.nsf.net, directory documents/rfc, file rfc1290.txt.)

Martin has compiled a guide to resources and indexes of resources available on the Internet. The first section provides instructions on retrieving lists of discussion lists, ftp sites, the *Internet Resource Guide*, and campus computing policy statements. Other sections cover OPACs, selected ftp sites, campuswide information systems, freenets, and more. Martin has been more selective than comprehensive, but for someone new to the Internet, this document provides guidance to some of the best resources.

*** 6.25 ***
Koppel, Ted. "Public Access Catalogs Available through Internet." *Colorado Libraries* 16 (June 1990): 31-33.

This article by a senior systems analyst at the Colorado Alliance of Research Libraries describes access methods to seventeen specific Internet library hosts. The succinct comments are based on the author's actual experiences and include only hosts he could reach. Terminal types supported and brief descriptions of database coverage, as well as special features, are included. Hosts with complex logon and other anomalies that make remote access difficult are noted. Both numerical and character addresses are given.

Technological Aspects

*** 6.26 ***
Dalton, Marian L. "Does Anybody Have a Map?: Accessing Information in the Internet's Virtual Library." *Electronic Networking* 1:1 (Fall 1991): 31-39.

Dalton's virtual library consists of full-text monographs and articles, photographs, bibliographic information, software, research data, bulletin boards, and directories, all available electronically over the Internet. Determining which computer host on the network holds a particular resource can be difficult, if not impossible, even for knowledgeable users. Dalton's article discusses the directories, guides, and programs currently available for locating resources on the Internet, as well as the standards and protocols being developed for this purpose.

One solution to this situation is to compile directories of resources, in either print or electronic format. However, these directories are not revised frequently enough to keep them current. Dalton points out that electronic directories can be updated frequently, but do not provide subject access.

Three standards presently exist that could be applied to directory automation. These are: Z39.2, the standard for exchange of bibliographic information; Z39.50, the information retrieval protocol; and X.500, which is designed for locating addresses of electronic mail users.

Both the MARC format and the X.500 standard could be adapted for use with the data elements necessary to support network access. Dalton mentions the Library of Congress' proposal for changes in USMARC to provide for control of online information resources.

She also discusses the New York State Education and Research Network (NYSERNET) X.500 directory of system users. The tree structure of the X.500 standard presents problems for the searcher, who must know something about that structure to use the directory effectively. Dalton also discusses the problems to be encountered in integrating information on remote resources into a local library catalog. Such information tends to change frequently, presenting a problem for patrons and catalogers.

Michael Schwartz's "Netfind" and Vinton Cerf's "Digital Library System" are also described. The first locates an individual user address in a database built from messages posted to USENET bulletin boards. Cerf's system uses servers employing programs called knowledge-robots, or knowbots, which can query multiple databases using a single search command.

*** 6.27 ***
Eveleth, Jan. "Internet Library Catalogs: The MPG as Emulation Negotiator." In *Proceedings: SIGUCCS User Services Conference XIX*. New York: Association for Computing Machinery, 1991.

Eveleth discusses Yale University's solution to the problem of mainframes that can connect but not communicate with each other. When logging on to remote OPACs, one sometimes finds that a connection can be made, but the screen is so full of extraneous letters and punctuation that it may be impossible to use the catalog. This situation arises when catalogs and the Telnet software needed to connect to them are run on different mainframes, such as an IBM connecting to a VAX mainframe. The problem is that some systems, such as IBM, display information in full-screen mode, while others, such as VAX, use a line-at-a-time approach. These two methods of displaying information require different kinds of terminal emulation. VT100 emulation is needed for line-at-a-time displays, tn3270 for full screen displays. Although software is available to handle both types of emulations, users are rarely aware of the software available on the local mainframe or the display mode of the foreign mainframe.

Yale's solution to this problem is called the MPG, for Multi Protocol Gateway. The gateway is a communications manager that can successfully handle both full-screen and line-at-a-time machines. The result is successful connection and communication for the user.

*** 6.28 ***
Lynch, Clifford A., and Cecilia M. Preston. "Evolution of Networked Information Resources." In *12th National Online Meeting Proceedings 1991*, 221-230. Medford, NJ: Learned Information, 1991.

This article covers similar ground to the authors' previous article, "Internet Access to Information Resources." It does, however, update that information on this rapidly changing topic. Resources available through remote logon continue to proliferate. For example, it is now possible to Telnet to British libraries on JANET due to a JANET-Internet connection. Increasingly, universities are making their campuswide information systems (CWIS) available on the Internet. A database of special interest may be accessible through a CWIS, OPAC, or its own Internet address. Some fee-for-service databases are now available over the Internet as well, including RLIN and OCLC's EPIC service.

Likewise, many new and different files are retrievable via ftp. Software archives can be found at many sites. It is also possible to retrieve Supreme Court decisions and bit-mapped images using the file transfer protocol.

The availability of new Internet information resources is being driven by two factors: 1) there are increasing numbers of workstations with bit-mapped displays in the hands of users, and 2) there is a move towards a client-server architecture model. Development of the X Windows protocol, which will allow access to image databases, and implementation of the Z39.50 protocol will also affect the future of Internet resources.

*** 6.29 ***
Lynch, Clifford. "Access Technology for Network Information Resources." *Cause/Effect* 13:2 (Summer 1990): 15-20.

Users of network information resources through remote logon face several barriers that can make access to those resources difficult. There are many types of user interfaces; searching multiple OPACs, for example, may require different search commands for each OPAC. Terminal incompatibilities must also be overcome, since some remote computers may be sensitive to the terminal emulation used for log-in. Selection of an appropriate database for searching is another problem facing the user of these resources. Directories may be useful, but they are usually not indexed; they may consist solely of instructions for logon and sample screens. Finally, users face the tedium of searching remote databases one at a time, transferring the results, and then editing results to remove duplicate or irrelevant retrievals.

Lynch suggests that one solution to this situation is the use of information server technology. Information servers are computers associated with networks that provide services to clients. Clients are programs that shield users from the multiple database protocols. In other words, users could submit a search to a client, which in turn would translate the search to the server. This model is based on implementation of the Z39.50 standard within the OSI protocol suite. Lynch explains what the standard can and cannot do, and identifies areas in which it must be expanded or revised. Other areas needing attention include automation of the process by which clients and servers negotiate searches, and the development of standards for database description, structure, and access points.

*** 6.30 ***
Lynch, Clifford A., and Cecilia M. Preston. "Internet Access to Information Resources." *Annual Review of Information Science and Technology* 25 (1990): 263-312.

This article provides an overview of the development of networks and network resources. In the first section, the authors begin by defining computer network concepts, such as LANs, WANs, TCP/IP, and OSI. This is followed by a history of computer networks in the United States, starting with the ARPANET in 1969. The availability of information resources over the Internet is described, including OPACs and full-text databases. The authors discuss some of the familiar problems with using such resources, such as the need to learn a new interface for each system used.

In the second section, Lynch and Preston describe and compare the two technological approaches to providing network access to remote information resources, namely terminal emulation and network-protocol-based approaches.

Finally, new concepts and resources are discussed, including Kahn and Cerf's idea of knowbots, computer programs that search the Internet for information. Databases of imagery and statistical data are being developed that will be Internet-accessible. The concepts of virtual reality and cyberspace represent the latest thinking of those responsible for developing the information access technologies of the future.

*** 6.31 ***
Burton, Jim, Jose Newport, and Everard Robinson. "OPACs and JANET: A Simple Technique for Easy User Access." *Program* 23:3 (July 1989): 257-268.

JANET, the academic network of the United Kingdom, offers access to several OPACs, but lengthy addressing codes and varying logon procedures can provide obstacles to casual users. A communications and a menu package on an IBM PC have been used at the library at Loughborough University to allow access to these OPACs with use of only cursor control,

return, and escape keys. The approach, developed to facilitate use of remote OPACs by library staff, allows users to highlight and choose items and to break the connection by pressing the escape key. User reaction has been positive.

The software packages, MENU and KERMIT 2.31, were chosen for availability and low cost. The minimum hardware required is an IBM PC with 256 Kbytes of RAM, a single floppy disk drive, and a serial communications port (RS232). Sample screens encountered when accessing an OPAC via a dumb terminal and when using the MENU/KERMIT software are included. Detailed programming methodology is given as well.

A list of 40 OPACs available on JANET includes institution, automation system, and percentage of the collection online for each. The list was compiled in February 1989.

*** 6.32 ***

Lynch, Clifford A. "Linking Library Automation Systems in the Internet: Functional Requirements, Planning, and Policy Issues." *Library Hi Tech* 7:4 (1989): 7-18.

This detailed article is a guide to functions to be considered when choosing a library automation system for use in a networked environment. For institutions trying to network with existing systems, the article provides a guide to troublespots and a list of desirable product enhancements that librarians may want to discuss with vendors.

Since library catalogs have historically been insular and have not been designed for network access, library automation systems may function unsatisfactorily when attached to a network. Management issues that are well known to the computing community but relatively unknown to librarians arise when library automation systems, particularly integrated ones, are connected to a network. Networking also raises public access issues for libraries that are relatively unexplored by the computing community.

In this article, Lynch concentrates on TCP/IP protocol, the protocol most prevalently used on campuses and the dominant protocol for interinstitutional communications. Many of his remarks also apply to OSI (Open System Interconnection) networks.

A library must recognize that it is connecting not only to the local network but also to the national network. Providing high-quality system support in this environment is much more complex than supporting in-library terminals, due to the vast variety of devices that are used for Internet access. Library personnel will not usually have the expertise to meet this challenge independently and will need to build close working relationships with campus networking and computer support staffs. Libraries choosing a turnkey system should consider a vendor's willingness and ability to support the troubleshooting required in the Internet environment. The trend toward turnkey systems running as applications in standard software environments on standard hardware platforms greatly facilitates the connection of local area systems to the network. Libraries accepting vendor-supplied TCP/IP software should understand Internet requirements and vendors' abilities to meet these requirements. The complex task of configuring a TCP/IP network host, which includes sublet masks, RAP (address resolution protocol), maximum packet sizes, default gateway addresses, and assignment of an Internet address for the host, should be done by or in close cooperation with campus networking staff. Libraries with networking expertise may choose to install their own sublets or their own routers to campus or regional networks. In such cases, the library may need to register a network number directly and to configure a gateway and one or more hosts. Gateway routing should always be done in consultation with campus and regional networking staffs, since errors can disrupt network traffic regionally or nationally.

Once a campus is connected to the Internet, the library must decide what services to provide to which communities and how networking fits into existing library activities. Typically three major network applications are available: Telnet, file transfer protocol (ftp), and simple mail transfer protocol (MST). Some TCP/IP packages also provide such additional applications as Network File System (NV), which permits files throughout the network to be treated as a uniform file system; X Windows, which allows communication with bit-mapped display workstations in a uniform, platform-independent manner; and name servers, through which hosts on the network can refer to other hosts by symbolic name rather than by network address. On general-purpose workstations or time-shared hosts, all these tools would usually be offered with appropriate security.

Use of industry-standard hardware and software platforms enables a library host to function as both a machine supporting library applications and a general-purpose computing resource for library staff and perhaps others. The library administration must decide either to support this dual role or to restrict its local system to library applications and offer general computing services to its staff through local workstations or time sharing on another campus mainframe. When following the first option, installing all TCP/IP applications will probably be desirable. In the latter case, implementing functions across the network may be a desirable complement to the support of remote log-in. Examples of complementary services include ability

to send mail campuswide, the generation of electronic recall and overdue notices, the downloading of files from other hosts for display, making information about the library available to the campus community via file transfer, or access to network resources for users. Such services require that library applications software be interfaced to the networking software package. Since this option does not appear to be offered by any major library automation vendor, the interface would have to be developed by the library.

Detailed usage reports, gathered either by logging files generated from the networking package or directly from library automation software, are useful in an Internet environment. The accessibility of such statistics as the number of sessions broken down by Internet address, as well as how well these statistics can be linked to statistics generated by the library automation application, should be considered when choosing a vendor-supported networking package.

Not all online catalogs display "acceptable behavior" when accessed through Telnet. Problems to be resolved through the design and implementation of library automation software include: 1) providing some kind of graceful LOGO command; 2) deciding which terminal types will be supported; 3) re-evaluating help messages for users; and 4) reconciling character-by-character with line-by-line reception of data.

In regard to terminal types, supporting a lowest-common-denominator, line-by-line terminal, with some more elaborate support for specific types, will support the entire potential terminal base. Many major library vendors, however, do not offer this option. Systems that support only IBM 3270-type, full-screen terminals will be accessible to limited numbers of network users and may be extremely difficult to use.

User messages should be re-evaluated, since a remote user's terminal may not require the same key strokes for specific actions as local terminals. Libraries may want to create a set of very specific messages for known terminal types and another set of more general messages for remote users.

As users realize the full scope of the networked library automation system, they will demand new and different functions from the online catalog. Patrons will expect continuous access, even when the library is closed. All activities such as database restructuring, which will disrupt access, will need to be announced in advance. Users whose workstations support window-based interfaces may leave open a window to the library catalog for days or weeks at a time, creating consequences for system management and capacity planning. Users will want to be able to move information out of the library system to their host computers or workstations through file transfer protocols or mail. Current awareness services, such as the ability to have a search run automatically and the results delivered to a user's mailbox, will be in demand. The library will do well to take the lead in offering such services, rather than permitting users to write their own programs, so that the library can control such factors as the timing of searches and the search construction.

Since the number of terminals that may attempt to access a system via the Internet is effectively unlimited; and since activity levels for those terminals vary drastically, a new approach to capacity planning is needed. Items to be considered include: 1) response time; 2) number of users who can be supported simultaneously; 3) number of signees that are rejected because the maximum number of users are already connected; 4) cost of supporting idle connections; and 5) peak query loads (i.e., the number of queries the system can support in a given time period).

System overload is a very real possibility. One tactic is to limit the number of simultaneous users. Although this is the simplest, most traditional way to combat overload, this approach may be least responsive to service and policy objectives of the library because it makes no differentiation between users or activities. Moreover, this method may cause problematic user behavior such as the opening of a connection before it is needed to insure access later in the day. Another technically complex but viable solution is to identify retrieval functions that are especially costly in terms of machine resources and are of relatively marginal value in terms of service and then to restrict these functions during periods of overload. The main problems with this approach are determining the functions to restrict and getting system support to restrict them, since most library automation packages do not offer this support. In addition, help messages must be developed to explain the varying behavior of the system to users. Even if this method is employed, other methods must be used for those periods in which the restricted functions are enabled. Yet another approach is prioritizing access. The user community might be divided into groups and controls applied to each group separately, or priorities might be set according to the database being searched. On a sufficiently sophisticated system, it may be possible to assign priorities based on search origin and to let the system overload "gracefully" by slowing down low-priority users first. Truly effective priority schedulers, however, are not simple to develop and are not offered by most turnkey system vendors.

Making the policy decisions necessary to set user priorities is likely to be difficult and politically sensitive, since different segments of the campus community have widely varying information needs. Library management must be involved in the complex, on-going process of resolving conflicts between users with

differing needs and securing funding to support ever-increasing demands for information services. Vendors must reflect the increased complexity of sizing capacity in their pricing schemes and performance guarantees. The library must compile detailed statistics about system use and response time, so that sound technical and policy decisions can be made.

Authentication (the process of determining a user's identity) and security (the control of access to resources) are important in a networked environment, since many approaches to resource management are predicated on having knowledge of the users. Security is especially important when the library automation system supports both staff functions and public access or when the system is used as a general-purpose computing resource as well as a platform for library applications. The library must decide whether each system user will be required to establish an account for public access.

Requiring user identification only when necessary, as for non-public access applications, and supporting optional user identification at other times may be the best solution, although it is the most complex in terms of system support. Information required for satisfying licensing agreements and for resource management could be collected by looking at the sources of incoming users. Institutional personnel who needed to sign onto the local host from a remote location could request a user ID, which would permit access to the institutionally-protected services. Users who want access to advanced services might be permitted to register themselves online. With this approach, few IDs will have to be issued. Unfortunately, the turnkey systems available from major library automation vendors do not support authentication by Internet support address.

Security mechanisms must be considered. Library automation managers should consult the vast literature on security in general-purpose computing systems. The security measures traditionally employed by libraries, including the three-character password, are hopelessly inadequate in the Internet environment. Segregation of function and a good password system will probably protect most libraries from commonplace security assaults. Libraries should stay in touch with campus computing personnel for assistance in combating more complex security problems, such as the Internet worm. Traditional password technology needs to be replaced or supplemented by personal authenticator devices or public key cryptosystems. Unfortunately these tools are not widely offered by vendors.

Connecting to the Internet is not problem-free, but it must be done. Libraries should seek help from the campus computing community, which has already addressed many of the challenges that seem new to libraries. The movement to connect academic libraries to the Internet will create tensions between libraries and vendors and will probably have a long-term impact on the vendor community. Developing the software features needed for effective network access could easily consume the entire development budget of most vendors, and Internet accessibility is irrelevant to much of the customer base of most vendors. No major vendor has taken a technical lead in developing such features. Some libraries may have to consider in-house development of next-generation public-access systems rather than the purchase of turnkey systems, thus reversing the trend of the past ten years.

*** 6.33 ***

Lynch, Clifford A. "Library Automation and the National Research Network." *Educom Review* 24 (Fall 1989): 21-26.

Drawing heavily on the experiences of the University of California (UC), this article describes automation at academic institutions, outlining major issues facing library planners and emphasizing the use of technologies such as nationwide computer networks.

From the late 1970s through the 1980s, libraries used computer technology to make changes in public access to their collections. By the beginning of the 1980s, most libraries had created a mass of machine-readable data describing their collections that could be made available to the public. At about the same time, the cost of the needed computer support came within the reach of most library budgets. Today, most major research libraries have public-access online catalogs. These systems primarily describe book collections, with access to journal literature generally entrusted to indexing and abstracting services. Although the online catalogs are limited in coverage, they permit much better searching than the paper card catalogs they replaced. For example, a researcher using UC's MELVYL union catalog can obtain a summary of all seventeenth-century publications in Portuguese held at any UC campus with a single command. The entire UC library system can be searched from home or office, 24 hours a day. The online catalog has raised user expectations for library service, particularly for delivery services and access to journal literature.

In the past two years, some major universities have begun offering access to selected journal literature in their online catalogs by licensing abstracting and indexing databases. These efforts have revealed a huge unmet demand for information which has staggering implications for library planners. For example, in May 1989 the MEDLINE database in MELVYL processed around 175,000 queries and displayed over 2 million records. Previously, such services as DIALOG and BRS offered access to journal literature, but they were expensive and difficult for end-users to manipulate. Easy-to-use, affordable access to journal databases will

increase their use in academic programs and will create more demand for such services. Licensing, mounting, and supporting access to the full journal literature will be more than a single institution can handle, because the financial, computing, and human resources needed are immense. Choosing which databases to mount is a difficult challenge, since no initiative is likely to be of equal value to all scholarly disciplines. Additional developments that will need to be addressed include delivery of actual information; preserving and storing information through electronic form; and image databases.

Connecting public access library information systems to research networks is a new consideration. This novelty is evinced by the poor support of remote access by most commercially available library automation systems, which are years behind general-purpose computing systems. When UC began experimenting with offering access to remote systems through MELVYL in 1989, making remote logon viable proved to be extremely difficult. Many systems assumed terminal type, required complex logon sequences, or lacked a way to log off. Even if such technical problems are solved, remote logon is not a long-term solution. Information servers based on the Z39.50 protocol must be built so that users will not have to learn a new interface for each system and so that results collected from multiple information resources can be consolidated and manipulated. Such information servers will have other uses, such as enabling CD-ROM databases to be integrated into an institution's computing environment and making "knowbot" programs viable. The proliferation of databases as network resources will create a need to more effectively match databases to specific information needs. Directories that go far beyond the current efforts to compile simple lists will be needed. As information servers mature and multiply, even the selection of databases to be searched will be automated.

Policy questions regarding how to share resources without overwhelming local systems will need to be addressed. In the case of library catalogs, most users will probably be satisfied with their local catalog, a few other catalogs of nearby institutions, and one or two regional catalogs of large institutions. In contrast, since journal databases are of equal interest everywhere, remote demand will be much greater. If journal databases become network resources, it will probably be in the context of interinstitutional consortia, whose members jointly license the databases, choose one or more members to mount them, and reimburse the host institution for remote use. Providing access to commercial databases that do not fit the mass-use consortium model may become an important role of the bibliographic utilities such as OCLC and RLIN.

*** 6.34 ***

Coursey, David. "Kapor Calls to Connect All Americans via the Internet." *InfoWorld* (25 May 1992): 94.

In this interview, Mitchell Kapor, president of the Electronic Frontier Foundation and chair of the Commerical Internet Exchange (CIX), discusses commercialization of the Internet as the next step in its evolutionary growth. Commercialization would result in better service and in incentives for the development of better end-user and client software. Universities should be subsidized to maintain their access, and the government concentrate on funding the next "precompetitive" technology, such as gigabit-per-second networks.

Building the national public data network atop the existing telephone network is advantageous due to the extraordinary expense of connecting 130 million households. But since the telephone companies' heritage is voice rather than data, they misunderstand data applications and have made numerous errors. They also do not view themselves as an open platform for development by third parties. Telephone companies must change their mindset in order to participate in the national data network.

*** 6.35 ***

Dern, Daniel P. "Applying the Internet." *Byte* 17:2 (February 1992): 111-118.

Dern discusses various applications of the Internet, including a brief section on OPACs. He describes the Advanced Photon Source being built near Chicago, which will allow remote scientists to request specific experiments to be performed and the resulting data to be sent to them via the Internet. Researchers also will use the Internet to link computer modeling simulations of ecological processes; searching for shareware, freeware, and data sets from remote computers using "archie," the Internet archive server listing service; interactive, role-playing simulations for K-12 students; and public access systems that allow electronic mail, file transfer, and other services for fee-paying users.

*** 6.36 ***

Nickerson, Gord. "Local Databases." *Small Computers in Libraries* 12 (January 1992): 37-39.

Many libraries have mounted locally-produced databases or purchased tapes of commercial databases on their OPACs. This is particularly true of libraries that use NOTIS' Multiple Database Access System (MDAS) software. Since OPAC software is used for searching and retrieving, the library does not have to buy a separate retrieval system and the user can search all databases in the OPAC with the same commands. Many libraries have done this. The availability of

Medline and Current Contents in MELVYL and Magazine Index and Trade & Industry Index in CARL are only a few examples.

However, there is a problem for Internet users who wish to access such resources: licensing agreements with the database producers often limit the use of commercial databases to local users. The producers fear loss of possible sales and downloading of data by remote users. These fears are irrational. Remote use tends to be occasional and a small portion of total use, since system managers restrict the number of remote users and the time of day they are allowed access. No responsible organization would rely on remote access in lieu of purchasing a commercial product or service needed by its patrons. Although remote databases may be used for occasional queries, product evaluation, and educational or training purposes, most places will buy the products and services needed for regular use. Downloading has not and will not hurt vendors' profits. Reselling copyrighted downloaded data is clearly illegal, so policing should not be problematic. Users do download from online services, but they do so for their own use and continue to use the services. Restrictive policies and high prices keep many databases from wider exposure and higher use, which could improve profits.

Despite restrictive practices, there are sites on the Internet that allow remote access to locally-mounted databases, including Texas A & M and University of Saskatchewan. David Fox of the University of Saskatchewan notes that they have had few queries from Internet users and he expects that Internet use is a small proportion of total use. Internet users are not considered to be regular clientele and should expect no direct support.

There is no comparison between the searching capabilities of an OPAC system such as NOTIS or BuCat and the retrieval software used in online or CD-ROM databases. Most commercially available NOTIS software is very primitive and usually limited in its functionality. Organizations mount databases on mainframes not to provide a state-of-the-art interface but to provide cost-effective access to heavily used databases.

*** 6.37 ***

Kalin, Sally W., and Roy Tennant. "Beyond OPACs: The Wealth of Information Resources on the Internet." *Database* 14 (August 1991): 28-33.

This general discussion of the Internet as an information resource identifies some representative examples of resources other than library holdings which have been mounted on OPACs.

Databases of regional information are offered on some OPACs. Denver Metro Facts, a part of CARL, includes a keyword index and names of personnel contacts at local companies. MIT's Techinfo and New York University's system are examples of Campus Wide Information Systems, which may inform users about local weather, housing, and restaurants. The University of Texas OPAC includes job postings. An index to the *Florida Times-Union* newspaper is available via the OPAC of the State University system of Florida. EDIN, the Economic Development Information Network of the Pennsylvania State Data Center, is also Internet-accessible. The Cleveland Free-net, developed by Case Western Reserve University, allows electronic visits to sites in metropolitan Cleveland, and offers access to various OPACs via the "Library" selection.

Dartmouth and Carnegie Mellon have incorporated specialized humanities databases into their online catalogs. Users of the Dartmouth Library Catalog can use the "select file" command to access keyword-searchable, full-text files of Shakespeare's plays, Shakespeare's sonnets, and the King James Version of the Bible. Arch Pic, part of Carnegie Mellon's OPAC, is a keyword-searchable index to architectural illustrations.

*** 6.38 ***

Keys, Marshall. "Local Systems and National Bibliographies." *Information Today* 8 (December 1991): 33.

In the author's former profession as an English scholar, he was hampered by the lack of a single national bibliography and was frustrated by the appalling quality of local catalog records. Catalogers often failed to distinguish among original texts, reprints, and microform copies, and authority was abysmal. Due to such developments as MARC, bibliographic utilities, and cooperative cataloging, universal bibliographic control seemed to be a real possibility in the late 1970s. The present picture looks less promising. Signs of regression include the collapse of discussions between OCLC and RLIN and Wetherbee's study, which indicates that many library directors and consortia heads do not understand and are not committed to the building of a national database.

A national bibliographic database is important. Library users have been victims of "quick and dirty" local cataloging and have wasted countless hours in trying to locate and identify items crucial for research. No library is serving its local patrons well unless it is sharing bibliographic information nationally. User access to remote materials depends upon every library's willingness to share records.

Ironically, commitment to a national bibliographic database is being withdrawn just when two important conceptual developments in librarianship make such a database crucial. These concepts, that access is more important than ownership and that delivering informa-

tion in time is more important than warehousing information, both depend on accurate, timely records centrally stored and easily accessible. The library catalogs accessible via the Internet do not constitute an online national bibliography. The Internet offers no common interface, no assurance of common bibliographic standards, and no way to know how online holdings compare to actual holdings.

*** 6.39 ***

Markoff, John. "For Shakespeare, Just Log On." *New York Times* (3 July 1991): D1.

The development of a nationwide data network will allow PC owners with relatively few computer skills to search through several terabytes of information in seconds. Such ready access has been the dream of many in the industry, but until recently progress was stalled by lack of computing power, effective software, and high speed digital networks. Although many of the technical problems are now being solved, business and political disputes involving privacy and pricing remain. Many sources, such as government documents, may be free, but some will be available only to those who pay. The industry has not yet settled on ways to protect and charge for intellectual property in an environment where information can be copied instantly. The new technology may transform the way computerized information is sold.

In 1989, Thinking Machines, with the support of Dow Jones, Apple Computer, and KPMG Peat Marwick, designed a computer library called the Wide Area Information Server (WAIS). WAIS permits computer users to quickly search through a huge amount of information stored at several remote locations. Commands are common English phrases. The system provides a sample list of documents in response to a search command. The user chooses one document or several; then a "relevance feedback" program presents other documents most like the ones selected. The WAIS system lets users of Apple computers search databases stored by several corporations and universities. Users can also read electronic mail, enter their corporate libraries, or summon a wide variety of documents, newspapers, and magazines. At Thinking Machines, WAIS allows employees to retrieve memos and other internal information, so that employees who are not working together can share expertise. WAIS delivers information on the Internet, a collection of 2,600 high-speed computer networks. This government-sponsored system is being improved and turned to commercial uses.

The market for software that enables rapid retrieval of computerized text is small but growing. In 1989, there were fewer than 60,000 users in the United States; by 1990, total sales were around $120 million. The Delphi Consulting Group predicts that the market will grow to 160,000 users and $235 million by 1992.

WAIS is built on Z39.50, a procedure for retrieving information developed by librarians who initially set out to computerize card catalogs. In the future, a special directory or "white pages" will keep an up-to-date list of all sources available on the network.

Apple has its own electronic library project, Rosebud, which is based on WAIS but adds features including the user's ability to develop a personalized electronic newspaper. The customer can specify the kinds of information and news he or she wants to retrieve from the system everyday. The necessary retrieval software might become a standard part of a computer's operating system. Improvements in the Internet are expected to greatly lower the cost of information searches and promote the introduction of new services. The government proposes to expand and improve the Internet by financing a National Research and Education Network.

*** 6.40 ***

Mitchell, Maurice, and Laverna M. Saunders. "The Virtual Library: An Agenda for the 1990s." *Computers in Libraries* 11 (April 1991): 8-11.

This article enumerates some of the issues and questions that must be resolved in order to make the virtual library thrive.

Completing retrospective conversion, particularly of unique collections, should be a priority. Policy questions regarding the distinctions between local and remote users will need to be addressed. Wider dissemination of access information and simpler access routines will be needed to make the network truly available to a broad spectrum of users.

Library instruction will be challenged to train naive users in use of electronic information and to help the invisible patrons who no longer need to come to the library to use the catalog. More libraries may need to form consortia to handle the increased costs of providing electronic resources. Campus computer centers will have to begin dealing with new technologies and with a larger and more diverse community of users.

Administrators will need to learn to budget for an access environment. Hardware must be provided in an environment where a computer life span may be as short as three years. Ways to use equipment beyond the point of technical obsolescence must be found, and legislators and others who administer funding must become committed to supporting upgrades and maintenance. Staffing needs may shift. User training will be the most critical need. A front-end system that would allow uniform access to all libraries will be needed.

Information technology has provided far more information than we know how to handle. Time-honored filtering techniques no longer work. We need a new way of thinking about information. New ways to distinguish the important from the unimportant must be found. We also need more powerful indexing systems for sorting, controlling, and manipulating the important information.

A workable, affordable knowledge navigator will be needed. Faster, more efficient technologies such as FDDI (fiber distributed data interface) must be investigated and implemented in order to provide the capacity for the expanding traffic on the Internet. The emergence of fast, affordable, and efficient freeform databases has begun to negate the need for extensive indexing; streamlined indexing practices will take advantage of such evolving technology and will reduce the time needed to make information available for use.

"The virtual library is one of the first steps toward creating the virtual university." Since teachers can no longer control the information their students see, the faculty member's role is shifting from conduit of information to moderator of information and its application. New models of teaching will be needed. Accreditation and evaluation standards will need to be reexamined; libraries may need to give up collection size as a relevant measure. Libraries may need to reallocate materials budgets. The question of providing information immediately versus providing text transmission or document delivery with a brief lag time may need to be considered. Federal funding of NREN will be necessary to insure that all higher education institutions can keep up in the access environment. Electronic publishing, interpretation of copyrights, and cost of access to libraries and databases are issues that are not close to resolution.

The virtual library is becoming a reality. Making the virtual library possible for more institutions will require collaborative planning and budgeting. Staffing and training of staff and users will need on-going redefinition. These changes will challenge our ability to manage an avalanche of information and will change the instructional processes of our universities. Copyright issues and funding will be large deterrents to rapid implementation.

*** 6.41 ***
Nickerson, Gord. "The Internet." *Small Computers in Libraries* 11 (September 1991): 25-29.

Nickerson's column, "Networked Resources," is designed to help librarians use the Internet. His functional, non-technical descriptions are aimed at new Internet users.

The Internet is a group of computer networks, mainly in North America but extending to at least 30 countries, all using Transmission Control Protocol/Internet Protocol (TCP/IP). TCP/IP is software that enables dissimilar computers to communicate with each other. On the Internet a user can access a remote computer as if directly connected to it and run programs, copy files, and perform other functions. The Internet has made the global village a reality, with one to five million users worldwide.

Using the Internet provides many advantages for librarians. Without leaving their libraries, librarians can talk with colleagues in remote locations, read journals, search databases, download software, and scan job listings. Access to large OPACs such as California's MELVYL can help with collection development and bibliographic functions. The Internet can also be used for interlibrary loan, electronic delivery of online SDI searches, and communicating with publishers via electronic mail. Many librarians subscribe to discussion groups such as PACS-L.

Beginning users must first find out if their organization is connected to the Internet. Consulting a colleague, computer center, or a reference such as !%@:: A Directory of Electronic Mail Addressing and Networks can help. It is also sometimes possible to get an account from a local college or university if there is no connection for one's organization. San Francisco, Minneapolis, and Chapel Hill are three cities that offer access through public access computers.

Once a user has an account, he or she will need to learn how to use the software, including connecting and disconnecting, manipulating files, and using applications such as electronic mail. Many computing centers offer training courses. Finding someone who can explain the procedures in non-technical language is helpful. Third-party books and professional journals are good sources of information. Library conferences sometimes offer sessions on Internet use.

*** 6.42 ***
Nickerson, Gord. "Remote Log-in with Telnet." *Small Computers in Libraries* 11 (November 1991): 25-26.

Remote log-in enables users to connect to any machine on the Internet and conduct a session as if they were directly attached to the remote host. The standard TCP/IP remote log-in protocol is called Telnet. Remote log-in makes a wide variety of resources and services available, including library catalogs, full-text databases, bulletin boards, and weather reports. Since these resources run on a plethora of machines, correct settings are required before communication can be established.

There are a number of versions of Telnet, for UNIX, VAX, or IBM systems, implementations for personal computers, and public domain and shareware versions for MS-DOS, Windows 3.0, and Macintosh.

To begin remote log-in, run Telnet and supply the address of the remote system. Most versions can use the Internet domain name (e.g., pac.carl.org); some versions require the IP numeric address (e.g., 129.32.159.19). Once connected, the user will need to use the commands used by the interface on the remote service, which can be problematic. Rather than using Telnet, users of personal computers can employ communications programs such as version 3.11 of Kermit or Telnet Driver from InterCon Systems. Using personal computers may result in mapping problems. Other possible challenges are connecting to a particular port and finding a way to exit the program. Another large obstacle is finding out what resources are available. Barron's and St. George's lists can be used as starting points.

Telnet's character-oriented design makes its future in the age of graphics systems uncertain. Although the X Windows interface standard offers a way to send graphics across the Internet, its widespread adoption would require much faster connections than are now available. The implementation of a client/server model in which the interface resides on the local system may improve accessibility. The development of standards will be necessary for the Internet to fulfill its promise as an information superhighway.

*** 6.43 ***
Notess, Greg. "Searching EPIC on the Internet." *OCLC Micro* 7 (October 1991): 23-25.

OCLC made its EPIC service available via the Internet in November 1990. Although there are many other ways to connect to EPIC, the Internet option is unique in that there is no communication charge. The savings can add up, but there can also be hidden costs and other problems with accessing via Internet. Hidden costs are most likely to result from local billing for Internet usage; checking beforehand will reveal whether or not using the Internet provides a cost-effective connection.

A more complex problem is getting access to the Internet; institutional computer centers can help with this. Once Internet access is available, connecting to EPIC is simple. When connected to the local mainframe, users type "Telnet" plus the address, an authorization number, and a password. Everyone using the Internet should be trained in correct methods of exiting and in ways to return to the EPIC sessions quickly if a microcomputer connection is accidentally broken. Backspace keys will not work properly with all software. Communications software that works well when using Telenet or other packet-switching networks may not work as well for searching on the Internet. ProSearch, for example, does not work well at all on the Internet. Communications software that supports VT100 emulation is needed. If logoff commands are stacked, full accounting information will not display with some software.

In spite of problems, time spent troubleshooting can result in significant savings. Sample sessions in practice databases can be tried to find out which Internet-connected computer or which software package will work best. Such sample sessions should include backspace attempts, multiple display requests, and command stacking. To mask passwords, users should develop an automated logon script that blanks the screen until the connection is established. If problems persist, users should change communications software or Internet connections.

*** 6.44 ***
Weiskel, Timothy C. "Environmental Information Resources and Electronic Research Systems (ERSs): Eco-Link as an Example of Future Tools." *Library Hi Tech* 9:2 (1991): 7-19.

As in other areas of research, there is more information than a researcher can possibly process in the field of environmental issues. In order to take advantage of the electronic information in environmental research, Weiskel developed an electronic research system called Eco-Link. Eco-Link integrates telecommunications software with a database manager and a word processor to access, process, and sort electronic information to produce bibliographies, directories, and information handbooks.

Weiskel provides several examples of how Eco-Link works with different types of electronic resources, including Internet-accessible OPACs. He first describes how the system can read a file of "screen dumps" from a particular OPAC, then stores the citations gathered in a standardized format. It can repeat this process with screens captured from several OPACs, then merge the citations to produce a subject-specific bibliography. Eco-Link can also search commercial databases mounted on an OPAC (if one has authorization for such) and sort citations by date to give a chronological picture of environmental events, such as the Exxon Valdez oil spill. Weiskel also gives the example of searching Academic Index for book reviews on a topic, then having Eco-Link search the library catalog for the detailed citation information for those books. It can also integrate the book citations found with the article citations from Academic Index to create a thoroughly researched bibliography.

Weiskel further discusses the use of Eco-Link with commercial services, such as DIALOG, as well as with CD-ROM products.

*** 6.45 ***

Arms, Caroline R. "A New Information Infrastructure." *Online* 14 (September 1990): 15-22.

This decade may bring about a fundamental transformation of the world of the librarian, due to the emergence of personal computers and networks. Librarians must respond by adapting their services and applying their expertise in the new environment.

A first step is to offer access to online catalogs over campus networks. The next is to add other bibliographic and reference databases to the local online service. Some libraries accept loan requests via electronic mail and deliver the materials by fax or campus mail. More importantly, librarians can familiarize themselves with the new "wired" environment. The networks of primary interest to academicians and researchers are the Internet and BITNET.

In the computing world, a network is like a highway system. The Internet, which is becoming the dominant network, is a group of interconnected national, regional, and campus networks that use the same communications protocols. A user with a personal workstation connected to a campus TCP/IP network can reach resources anywhere else on the Internet. BITNET is the first network for those who are not computer scientists. BITNET was intended to be accessible and affordable to all universities, with network speed to support electronic mail but not necessarily interactive sessions.

Demand for links between the national networks has grown. Since the protocols are very different, a simple merger is not technically feasible. Mail "gateways" have allowed BITNET users to exchange mail messages with Internet users. To simplify the process, BITNET is encouraging the adoption of the same addressing scheme that is used on the Internet. For mail within the United States the two networks will soon appear to be one. However, direct file transfer between the networks is not possible, and interactive access to remote hosts will never be supported by BITNET protocols. Unless or until the federal government funds a comprehensive network whose charter is to serve all constituencies, a need for at least two networks will remain.

Decentralization has pros and cons. Decentralization and the entrepreneurship it has encouraged have resulted in improved software and new services, most of which were made available to other institutions for little or no cost in a spirit of cooperation. However, the lack of centralized registration of services means that identifying available resources can take detective work or access to an appropriate grapevine. One reason for librarians to be involved with networks is to bring their expertise to the challenge providing the equivalent of bibliographic access to this burgeoning array of resources. Another is to bring their experience of patrons' information needs into the effort to develop new services. Academic and research networks are here to stay, since researchers in many fields find them to be essential. However, the current organizational structure of the Internet emphasizes research rather than education. Librarians and other representatives of the educational community must join together to insure that "the rest of us" are not overlooked.

In 1989 Senator Albert Gore introduced the "National High-Performance Computer Technology Act of 1989," which would establish a national network analogous to the Interstate Highway System. The National Science Foundation would be charged with establishing a three-gigabit/second National Research and Education Network (NREN) by 1996. The high speed would be important to researchers in fields such as astronomy, meteorology, and high energy physics. For the average academic and librarian, the important aspect is the specification that the network include the higher education community. A proposed advisory committee would include college and university educators and librarians.

The Corporation for National Research Initiatives has proposed one design for a library of the future. The Digital Library System would be a collection of cooperating computers on a high-speed network. The user's workstation would hold a personal library system integrating a word processor, spreadsheet, graphics software, and bibliographic file manager. The personal library system could communicate with servers on the network to retrieve additional information and could be customized to the interests of its owner.

A sidebar gives specific information on joining a network and obtaining lists of resources.

*** 6.46 ***

Arms, Caroline R. "Using the National Networks: BITNET and the Internet." *Online* 14 (September 1990): 24-29.

Although today's networks, BITNET and the Internet, are not ideal, they are already essential tools for many researchers. Librarians can take advantage of these networks to maintain communication with colleagues, write joint papers, and keep up with developments in the field. By using the networks themselves, librarians can become competent to guide their patrons through the emerging infrastructure of machine-readable information.

The first step for librarians is to begin using electronic mail; second is to join some library-oriented bulletin boards such as PACS-L, NOTIS-L, or MLA-L. Both BITNET and the Internet provide access to files of text and data for downloading. Resources include past postings from bulletin boards, non-commercial

software, documentation, working papers, reports, newsletters, committee minutes, and files of numeric data. Since the networks lack a central staff to catalog a constantly changing set of resources, locating relevant files requires detective work. Finding these resources requires the same skills that reference librarians use for locating appropriate print sources for patrons.

Underlying differences between BITNET and the Internet become obvious when trying to download files. File transfer on the Internet is accomplished by using File Transfer Protocol (ftp). Since file transfer over BITNET does not involve direct interactive connections, files may take several hours or days to arrive. Unlike ftp, which operates in the same way at all sites, different servers on BITNET use different commands and offer different functionality. Since more and more institutions attached to BITNET are also connecting to the Internet, it is unlikely that a standard procedure will develop for accessing Internet files over BITNET.

The Internet supports interactive use of remote systems. Some specialized resources such as Dartmouth's Dante database are accessible at no cost to scholars working in the relevant disciplines, but accounts must usually be formally requested. Other resources such as the databases of the Research Libraries Group are accessible for a charge. Online catalogs of many universities are available without accounts or passwords; these may be searched to check citations, to review collections strong in particular disciplines, or to prepare for trips to distant libraries.

The resources on today's networks are only the tip of the iceberg. New systems, files, and applications are appearing monthly. Of particular interest to librarians is the emergence of online publications, including refereed journals such as *New Horizons in Adult Education* and *Post-modern Culture*. Since electronic publications will undoubtedly proliferate, librarians must learn to locate these journals for patrons.

The current protocols are primitive compared to the powerful tools and easy interfaces that may be built.

Sidebars offer specific directions for accessing bulletin boards and using ftp.

*** 6.47 ***
Britten, William A. "BITNET and the Internet: Scholarly Networks for Librarians." *College & Research Libraries News* 51 (February 1990): 103-107.

This article is aimed at librarians who are beginners in networking. Most college and university librarians can presently get access to online library catalogs, databases, newsletters, discussion groups on library topics, and innumerable other files and programs via BITNET and/or the Internet. Developed from the EARNED, the Internet topology now consists of the NSFNET backbone, which is managed by IBM, MCI, and the MERIT computer network. The Internet is connected to nearly 1,000 government, regional, and campus networks. Internet resources offered by research libraries include OPACs, local databases, regional newsletters, hypercard stacks, and public domain software. The Internet is accessed from a computer connected to the network which has resident network protocol (TCP/IP) software. The two main commands used for Internet access are ftp, through which documents or software can be transferred, and Telnet, which allows logon to remote hosts. Each Internet address has two versions: domain name, which consists of letters and periods; and IP address, which consists of numerals and periods.

BITNET (Because It's Time Network) is a research network for electronic mail and file transfer. In 1989 BITNET, Inc., merged with CSNET to form the Corporation for Research and Educational Networking (CREN). Nearly 500 colleges and universities can access BITNET, many more than the Internet. In addition to electronic mail, BITNET offers electronic journals, file servers, and, perhaps most important, interest group lists (also called discussion groups). A discussion group uses one address for contributions to the list and another for subscription requests.

A "networkography," a select list of fifteen electronic resources, ends the article. Six library-oriented discussion groups, documents available through ftp, and an online newsletter are included. Art St. George's Internet-Accessible Library Catalogs and Databases is identified as the most important tool listed. Each citation includes specific access instructions.

*** 6.48 ***
Cline, Nancy. "Information Resources and the National Network." *EDUCOM Review* 25 (Summer 1990): 30-34.

This article highlights library processes and developments related to networking and emphasizes the information potential of the network and a significant role for librarians. The real value of the network will result from information resources and services made widely available. One change is that for the "virtual library," access is often preferable to ownership.

The interdependence of libraries and computing/telecommunications organizations is obvious. The "virtual library" will seek to enable information exchange between scholars, equitable access to networked resources, full use of networked services by scholars, and the identification of new resources and services. Present uses of computing and telecommunication capabilities in libraries include: 1) ordering, billing, and claiming; 2) acquiring and managing serials; 3) providing online public access catalogs; 4)

accessing other institutions' online catalogs; 5) retrieving information from subject-oriented bibliographic databases such as ERIC, AGRICOLA, and MEDLINE; 6) transmitting interlibrary loan requests and delivering documents; 7) disseminating unique information access to users in remote locations; and 8) providing access to electronic bulletin boards and journals, data files, and electronic encyclopedias.

Scholarly communication is changing due to computing and telecommunications. The virtual library will be integral to the new academic/research structure and will advance the academic mission. Our challenge as educators is to coordinate organization, access, and dissemination.

Libraries are experimenting with creating electronic information products. A university-based publishing network, with governance residing in the academic sector, has been proposed. Research on Z39.50 is under way. Several nonbibliographic databases such as MEMDB (Medieval and Early Modern Database) are available in RLIN. All of these programs required the development of strategies for access, thesauri, and standard methods of encoding.

Scholars dealing with "publish or perish" often find traditional journals to be unsatisfactory means of disseminating the results of research. Computing and telecommunications will probably provide new ways to disseminate research output.

*** 6.49 ***

Muratori, Fred. "RLIN Special Databases: Serving the Humanist." *Database* 13 (October 1990): 48-52.

In the summer of 1989, the Research Libraries Information Network (RLIN) became available to the individual scholar who has a personal access account, a computer, and a modem that can reach the Internet or Telenet. Service charges are based on connect time and network access.

This service is particularly important to humanist scholars, as the Research Libraries Group (RLG) seems particularly sensitive to the needs of humanities researchers. In addition to its primary database of library holdings in all subject areas, RLIN offers sources of interest to specialists in history, architecture, literature, art, and women's studies. These databases can include information on manuscript collections, machine-readable data files, pre-20th century printed texts, and research in progress. This article surveys five humanities databases offered through RLIN: AVERY, ESTC, RIPD, SCIPIO, and AMC. RLIN consists of three parts: the primary file of library holdings, Library of Congress name and subject authority files, and special databases. RLIN offers a wide variety of access points, Boolean capabilities, many different record display formats, index displays, and limit capabilities that can narrow unwieldy search results. For archival collections, the database also gives the location of materials.

The Avery Index to Architectural Periodicals is accompanied by the Avery Reference File, which functions as an online thesaurus. It is also available on DIALOG; however, the RLIN version is updated more often than is the DIALOG file.

The Eighteenth Century Short Title Catalog (ESTC) contains records for English-language imprints that appeared worldwide from 1701 through 1800. Library holdings in North America and the British Isles appear in each record. A great value of ESTC for reference librarians is in its role as index to The Eighteenth Century, a microfilm version of 18th-century texts.

The Research in Progress Database (RIPD) presently focuses on literature, linguistics, and women's studies. Included are books, dissertations, forthcoming journal articles, conference presentations, working papers, grant proposals, data surveys, videotapes, and films. Two online thesauri, the MLA Thesaurus of Linguistic and Literary Terms and A Woman's Thesaurus, are available.

The Sales Catalog Index Project Input Online (SCIPIO) indexes art sales catalogs owned by the libraries of eight prominent institutions. The Metropolitan Museum of Art, Art Institute of Chicago, National Gallery of Art, and the Getty Center are among the participants. Access points include auction house, place or date of sale, and seller or collector. Catalogs from the late sixteenth century to the present are included.

RLIN Archival and Manuscripts Control File (AMC) is the archival component of the primary file of library holdings. AMC has become the predominant national database for archival materials, storing records contributed by research libraries, state and federal repositories, and others. Archival holdings are so large and varied that detailed records for each separate item could impede a researcher's progress. Most records in AMC describe the scope of archival collections, noting time span, size, types of materials, historical or biographical data, existence of finding aids, donor names, citation instructions, permission information, and physical location. Many subject headings and added entries are used. These records aim to provide enough information for a researcher to decide whether a collection is worth visiting. The AMC file will have a major impact on the way historians do their research.

Sample records from each database and searching hints specific to each database are included.

*** 6.50 ***
Nielsen, Brian. "Finding It on the Internet: The Next Challenge for Librarianship." *Database* 13 (October 1990): 105-107.

Since the information-retrieval innovations of the late nineteenth century followed by several years the growth in publishing brought on by technological advances, it makes more sense to consider librarianship to have been "invented" in response to technological changes than to think of the occupation as timeless. Librarianship will need to be "reinvented" to account for electronic communication as a major means of knowledge dissemination.

How to make the Internet a truly usable tool is the issue of the decade for those interested in information delivery. As the Internet's explosive growth threatens to get out of hand, librarians are being challenged to invent solutions to new problems that are similar in some respects to nineteenth-century retrieval problems. The Internet offers access to scores of online catalogs, hundreds of discussion groups, and many research databases that will never be commercialized and fully documented. Who will take responsibility for keeping track of these resources, particularly those of limited or non-commercial interest?

At the first organizational meeting of the Coalition for Networked Information, steering committee member Bill Arms gave a talk titled "Three Assumptions and Five Questions about Networked Information." Assumptions included: 1) that the Internet will be the basis for academic computer networking among scholars for many years to come; 2) that users will have diverse computing environments; and 3) that the range of information providers will be similarly diverse. Questions included: 1) How do we know what is on the network?; 2) What formats will be used to store information on the network?; and 3) How will we do searching and retrieving? Arms' answers to the questions focus on use of standards, an area in which librarians are knowledgeable and experienced.

The Anglo-American Cataloging Rules for descriptive cataloging of computer files and MARC format standards can be used to catalog electronic files available via the Internet. But whose job will it be to catalog Internet files? Assigning this responsibility on the basis of ownership, as has been done with print materials, makes less sense for publicly-available electronic files. Moreover, most files of interest to researchers are not controlled by libraries. Should electronic serials and discussion groups be cataloged so that users will know about them? Since hundreds of these resources are available, should we develop a "selection policy" to decide which ones will be cataloged?

Some individuals, such as Art St. George and Ron Larson, have created electronic directories of Internet resources, and printed lists exist as well. The Research Libraries Group has undertaken projects to create MARC records for the Inter-University Consortium for Political and Social Research Guide and for texts in the Oxford Text Archive.

Presently the rules for access to the Internet are unclear. Most users are attached to organizations involved in government-funded research. Many corporations, including IBM and Apple, have connections. The passage of the National Research and Education Network (NREN) bill would open the Internet to more users and would have a profound impact on libraries.

*** 6.51 ***
Rockman, Ilene F. "Reference Uses of Campus Computer Networks: A Bibliographic Guide." *Reference Services Review* 18:2 (Summer 1990): 39-44.

Rockman's "guide" is composed of three related sections. The first introduces eleven major computer networks, including BITNET, ARPANET, and the Internet, and describes their founding, size, and constituencies. The second section is an annotated bibliography of twenty citations on the subject of computer networks from 1980 to 1990. Most focus on libraries and campus networks, the National Research and Education Network (NREN), and the Internet. The final section provides addresses of networks to contact for further information.

*** 6.52 ***
Stahl, J. Natalia. "Using the Internet to Access CARL and Other Electronic Information Systems." *Science & Technology Libraries* 11 (Fall 1990): 19-30.

This article describes a small university's experience with Internet-accessible information resources, particularly CARL's UnCover service. Clarkson University, an independent university with an enrollment of 3,500, has strong programs in business and engineering as well as growing research programs. Located in rural upstate New York, it is relatively isolated from other major scientific, business, and engineering collections; as a result, access to electronic information systems is considered to be vital.

In spite of fiscal restraints and a relatively small staff of six professionals, Clarkson has some advantages that have helped facilitate the introduction of electronic information systems. The university's board and administration has had a long-established policy of supporting exploration and exploitation of electronic resources. The campus libraries, academic computing, administrative computing, and audiovisual resources have been combined into one unit and housed in an Educational Resources Center (ERC). The university

provides a microcomputer to each student and faculty member, and faculty offices and public access microcomputer clusters are connected to the campus network; hence the user population is sophisticated and desirous of using electronic resources.

Clarkson is a member of NYSERNet (New York State Education and Research Network) and uses the same TCP/IP communications protocols as NYSERNet. For this reason, Clarkson faculty and students can sign on to remote hosts as easily as they can log on to the Clarkson host. NYSERNet provides links with other regional networks, forming a de facto national internet.

CARL's UnCover database first became available in 1988, and Clarkson subscribed in the fall of that year. The flat-rate fee per password provided an economically feasible rate structure for the small university. UnCover indexes articles in current academic journals. Author names and all significant words in the title, including abstracts and phrases included on the contents page, are searchable. Limited Boolean searching is possible. Users can browse journal titles, then select a title and a particular issue; it is then possible to reassemble the table of contents for that issue. At Clarkson, the CARL passwords were made public to make remote use possible. The service received a positive response from faculty and graduate students, and more passwords were needed to keep up with growing demands.

For libraries contemplating the addition of such a service, Stahl points out concerns to be addressed in three areas: technical problems, interface problems, and promotional considerations.

In the technical area, down time is a concern. Clarkson has experienced some periods of inaccessibility, but this was a greater problem when CARL was still accessed through the University of Colorado's network connection. The connection became so much more reliable when CARL established its own network node that down time ceased to be a major problem.

A greater concern has been the interface. Clarkson's campus computing staff created command scripts, so that users signed onto Clarkson's host need only type CARL to connect. Many of Clarkson's users have needed no help to use CARL's menu-driven user interface. Others have said that the Wilson database is easier, but Wilson has been available to Clarkson patrons for a longer time than has CARL. ERC personnel are developing written CARL documents for common needs such as finding a certain author, locating articles on a certain subject, or viewing journal tables of contents. As more Internet services are added, interfacing becomes more complex, since hosts may have varying search protocols, terminal identifiers, key configurations, and exit commands. Brochures for each system are needed. Over time, users can be expected to identify the databases they need most and concentrate on learning those specific systems.

Since promotion of Clarkson's UnCover service has been through the ERC newsletter, which is read largely by faculty and graduate students, these groups comprise most of Clarkson's CARL users so far. To increase promotion to undergraduates, Clarkson plans to take advantage of the option of limiting UnCover to locally-held journals. Clarkson is creating a tape of the OCLC and ISSN numbers of their journals, which CARL will match against the UnCover database. Clarkson will contract with CARL to allow users to first access only local holdings, with the use of the entire UnCover database available as an option. This institution-specific design will make the service more valuable to undergraduates. One microcomputer workstation in the reference area will be dedicated to CARL, and its use will be heavily promoted to undergraduates through bibliographic instruction.

CARL also offers access to the OPACs of Colorado academic libraries. At Clarkson, searching other research library catalogs by subject has proved to be very valuable, since most online databases do not include older materials or monographs. Such searching can help to compensate for physical isolation from large research collections. Clarkson patrons can also access MELVYL and Rensselaer Polytechnic Institute's INFOTRAX via command scripts. ERC personnel plan to distribute information on more Internet-accessible OPACs as they test each system and compile documentation for users.

Clarkson hopes to offer more information services via the Internet in the future. One area of great interest is document delivery. Another is access to commercial databases, provided that a pricing structure can be developed that will make such resources as the *Academic American Encyclopedia* and MEDLINE financially accessible to smaller institutions.

*** 6.53 ***

Kibbey, Mark, and Nancy H. Evans. "The Network Is the Library." *EDUCOM Review* 24 (Fall 1989): 15-20.

This article focuses on the network as the foundation for information delivery and on the facets of network development that directly affect the electronic library. Project Mercury, Carnegie-Mellon University's and OCLC's project to build a prototype electronic library and test it with a real user population, is described.

The meaning of "electronic library" depends on the perspective of the person describing it. Institutions will operationalize the vision of the electronic library differently to reflect local needs. The critical factor is that the library is a network of information tools and

services rather than a local collection of hardware and software. Many components necessary for the electronic library are now available and more are being developed. These components include: 1) information available in machine-readable form from publishers; 2) lower costs for computer storage; 3) campus infrastructures of personal computers; 4) increased computer literacy; and 5) advances in data communications and networking. Location independence, breadth of contents, and ease of use are important characteristics of the electronic library. Standards are needed for document representation and exchange, information retrieval, communication/networking, and display interface.

Project Mercury began in 1988, with the first working prototype expected in the fall of 1989. The search engine is Newton from OCLC. The retrieval standard is Z39.50 using ISODE. The user interface was originally developed in DeeWindows but was slated to be moved to Motif. Mercury's library will cover artificial intelligence. Texts of journal articles, technical reports, elements of the near- and non-published literature, and indexing of these documents will be included.

The second half of the 1980s was spent providing access to online catalogs and other information sources through networks. As a result, the list of library systems available via networks is growing rapidly. Incompatibility of user interfaces is a huge problem. A standard retrieval protocol that specifies the formatting of basic Boolean searches is the correct approach to this problem. Z39.50 is a good start.

Original CD-ROM products were non standards-based and could not be networked. The "digital library" of the NeXT computer likewise can be accessed only through the individual workstation. These variations hint at the challenge of making a wide variety of independently-produced information resources compatible for networking. Many different document representation formats are now in use, each with its own implications for retrieval.

Economics and intellectual property issues create the greatest uncertainties for information producers. Both authors and publishers have legitimate concerns that must be protected. Uncertainties increase as formats become easier to transmit, index, and manipulate. A combination of reasonable pricing and accepted rules of conduct is needed.

Today's common library services are operational because librarians pursued interinstitutional arrangements and set standards. Librarians must be similarly active in creating the networked library. Libraries and librarians should work with systems designers to develop specifications for user-centered systems and to test those systems in real environments. Librarians should also work to expand the concept of "publishing," with libraries perhaps becoming "publishers" themselves.

*** 6.54 ***

Lynch, Clifford A. "From Telecommunications to Networking: The MELVYL Online Union Catalog and the Development of Intercampus Networks at the University of California." *Library Hi Tech* 7:2 (1989): 61-83.

Lynch provides a historical description of the creation and evolution of MELVYL through the 1980s. Emphasis is primarily on the technological obstacles and developments that enabled the University of California to link its nine campuses' library catalogs on its own network. Of interest is the discussion of MELVYL as a national resource accessible over the Internet.