
Optical Disc Applications in Libraries

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INTRODUCTION

OPTICAL DISC STORAGE TECHNOLOGY is among the most recent computer technologies to enter the library community. Characterized by extremely high density data storage, optical discs offer storage capacities measured in millions of characters per square inch. These discs offer the potential for significant savings in shelf space in a library community where the cost of space is always increasing. The computer systems developed to utilize these discs offer improved search access to materials at high rates of speed.

There are a number of optical systems and services in production and available. In addition, there is continuous development of new products and services as well as improvements to the technology itself which could have significant impacts on the libraries of the future. Every aspect of library operations from acquisition of materials to technical processing and document delivery is being touched by optical technology.

This article will discuss various applications of optical technology found in libraries today. It will include research and development activities at the National Libraries as well as the use of existing products and services at a variety of public, state, and academic libraries.

For purposes of this discussion, the definition of *optical disc* will include any disc which is recorded or read using a laser. Distinctions relating to recording medium, recording process, or size of recording medium will not be discussed at length. This article is not meant to be a technical description of the variety of optical discs, but a discussion of their uses within various libraries.

NATIONAL LIBRARIES

The Library of Congress (LC), the National Library of Medicine (NLM), and the National Agricultural Library (NAL) each have projects underway which utilize various optical technologies as part of their mission to provide the world's information resources to the American public.

Library of Congress

The Optical Disk Pilot Program, which began in 1982, is one of the most important experimental projects underway in terms of the potential for changing the future of libraries. The program is divided into a Print Project and a NonPrint Project, both of which will be discussed. The Print Project has an overall objective of evaluating the use of optical disc technology for information preservation and management. This project is exploring new opportunities for information storage and retrieval through storing high resolution digitized page images on optical disc.

Developed under contract by Integrated Automation, Berkeley, California, the optical disc system is capable of scanning and digitizing both printed pages and microfiche. Each printed page or microfiche frame is scanned at 300 dots per inch. Using sophisticated compression techniques, the digitized data are then compressed and stored on twelve-inch write-once-read-many (WORM) optical discs which are stored in a jukebox for subsequent retrieval, display, and printing.

The Input Subsystem for the Optical Disc (ISOD), which handles all scanning and quality control, was developed by staff of the Automated Systems Office of the Library of Congress to run on Data General minicomputers. Basic retrieval for the system is provided through the library's SCORPIO retrieval system which is resident on an IBM mainframe. An Optical Disc Interface System (ODIS) provides the linkage between the mainframe system and the optical disc system which allows users to search and display documents from the jukebox.

Six user workstations are located in various reading rooms of the Library of Congress for patron use. Users can search the bibliographic databases developed by the library and retrieve full text images of scanned documents. In addition, the Magazine Index, a product of Information Access Corporation, has been integrated into the system to provide an additional retrieval approach which includes article level access. Regardless of which retrieval approach is selected, users get a high resolution display of selected documents and the capability to print each page image.

There is a wide variety of material in the system ranging from several thousand articles and government documents from a public policy file to various popular and scientific journals, law materials, and manuscripts. Copyright clearance was provided by publishers before the materials were scanned into the system.

An evaluation of the Print Project was carried out by Sterling Software, Rockville, Maryland. A comprehensive evaluation report is to be issued by the Library of Congress at the completion of the Print Pilot Program in late 1988. The future use of the optical disc system as a continuing program of the Library of Congress is still under consideration.

The Nonprint Project of the Optical Disk Pilot Program has taken a slightly different approach to using optical technology. Rather than utilize the largely experimental WORM discs as in the Print Pilot Project, the Nonprint Project focuses on the use of analog videodiscs for storing graphic materials and digital audio discs for storing sound. The primary purpose of the project is to experiment with ways of providing greater research access to special materials.

Six laser videodiscs have been created during the project. These discs contain a variety of material from images in specific collections in the Prints and Photographs Division—such as the Farm Security Administration Collection and the American Cartoon Drawings Collection—to motion picture stills, television productions, and early films from the Paper Print Collection. Two compact digital audio discs containing a number of musical compositions have been completed and are also available for use.

Access to the discs is provided in a number of ways. A microcomputer linked to a videodisc player with two monitors is used to access still images. BRS/Search software from BRS Information Technologies is used to provide retrieval access to the material on the discs through a microcomputer database containing descriptive information for each picture. This database can be searched for specific subjects or pictures by a specific photographer, and once a descriptive record is found, a direct link to the videodisc player displays the graphic desired. A user can also browse the disc in a linear fashion using the videodisc player with a remote control. Once a picture is found, the caption information can be displayed. It is also possible to print a copy of any graphic on the discs.

The disc with motion picture stills is only accessible through a table of contents which is available on the disc and also as a printed list. The list is used to identify a frame number which is keyed to display the picture desired. There is no computer database available for this material. However, only a videodisc player and monitor are necessary to use the discs. Discs with motion picture material and digital audio discs with music will be accessed in basically the same way as the cans of film in the library's collection—i.e., through the catalog.

As with the Print Project, an evaluation mechanism has been used to determine the effectiveness of the videodisc and digital audio disc technologies for providing access to the various materials. The discs with still images were judged very successful at providing enhanced access while saving original materials from repeated use. However, because of the wealth of material to be processed, work is underway to

move the database from a microcomputer system to the Library of Congress mainframe system and to integrate it into the available retrieval approaches.

Another project at the Library of Congress is the use of Compact Disc Read Only Memory (CD-ROM) discs for the distribution of cataloging data. The Cataloging Distribution Service (CDS), which is responsible for the distribution of Library of Congress cataloging data to the library community, has an experimental project underway to develop CD-ROM versions of some of LC's most used materials—Subject Authorities, Name Authorities, and US MARC bibliographic records.

CDMARC Subjects, which includes the entire LC Subject Authority File on a single CD-ROM disc, underwent rigorous testing in early 1988. The disc was available at microcomputer workstations at the Library of Congress. It was also tested at the LC field office in New Delhi, India, and at sixteen test sites across the country including the National Agricultural Library, Yale University, Missouri State Library, Geac, and Baker and Taylor.

Developed under a contract with Online Computer Systems of Germantown, Maryland, all CDMARC products will be available with a user-friendly retrieval package using keyword searching, full Boolean logic, and the capability to display and print the full ALA Character Set. The system has been designed so that all records can be output in full MARC format for processing in various ways. As CDMARC Subjects is being tested, a second product, CDMARC Names, is under development. CDMARC Names will include all name and series authorities established by the Library of Congress. This product will be developed as a three-disc set. With three CD-ROM drives connected to a microcomputer, CDMARC Names can be used without swapping discs. However, the product can be used with only a single drive and the system will automatically direct the user to mount additional discs as required.

The third product to be developed is CDMARC Bibliographic. This will be an eight-disc set of nearly 3 million MARC records. All LC MARC records for books, serials, maps, music, and visual materials will be included. The product is being designed to operate on a microcomputer with as many as eight or as few as two CD-ROM drives.

The equipment necessary to use CDMARC discs includes an IBM PC, or selected compatible, with 640K RAM and a standard CD-ROM drive. A printer is optional. In addition, if support for the ALA Character Set is desired, a Hercules Plus or Hercules Incolor Card and a Hewlett-Packard Laserjet Plus printer are required. MS-DOS 3.1 or higher is necessary to use the CDMARC software.

This project has moved from the experimental stage to actual product offerings in only 2½ years. CDMARC Subjects became available for purchase in mid-1988. CDMARC Names will be tested in late 1988 and offered for sale in early 1989. A prototype for CDMARC Bibliographic should be available sometime in 1989.

National Agricultural Library

The National Agricultural Library has a number of optical technology projects underway. The first project used digital videodisc technology for distributing textual information. This experimental project provided experience in converting printed text to machine form and in providing microcomputer access to full text.

The first videodisc contained the full text plus graphics for the *Pork Industry Handbook* and was evaluated at three test sites, including the National Pork Producers Council, Purdue University, and the National Agricultural Library. The twelve-inch digital videodisc is accessed using a microcomputer with videodisc player and controller plus a second monitor. This dual screen system enables a user to view both text and graphics simultaneously. The BRS/Search software from BRS Information Technologies is used for retrieval. A second expanded disc was developed during 1986 and 1987. Thirteen government publications were selected for inclusion on the second disc. The publications include such agriculturally related titles as *Soil Taxonomy*, the *National Corn Handbook*, and the *Fact Book of Agriculture*. Sixteen land grant libraries are participating in this project. Each participant will provide all hardware and software to use the disc at an estimated cost of \$12,000. The second laser disc was distributed to participants in August 1988 and will be evaluated for a six-month period.

A second videodisc project focused on the storage and retrieval of visual material including photographs, slides, posters, and filmstrips. The Forest Service Photograph Collection, which is the largest photograph collection on forestry in the world, is part of the Special Collections program at NAL. This historic research collection was begun in the nineteenth century and currently contains over .5 million images. It was the basis for the development of a twelve-inch analog laser videodisc used to evaluate optical technology as a medium for storage and distribution of graphic materials.

With the assistance of the University of Maryland Library, images from the collection were processed for mastering onto a videodisc. The completed disc contains over 34,000 images along with 500 color slides, a number of illustrations, maps and posters, and portions of a filmstrip. This disc can be used in conjunction with a descriptive database to search and display any of the images on the disc. The descriptive database includes information for each image such as photographer, subject, location, and date.

One of the most important findings in this project was the high level of quality possible in transferring images to videodisc. Many of the photos in the Forest Service collection are very old and are deteriorating. It was possible to do image enhancement on many of these to the extent that the videodisc image is better than the original.

Compact Disc Read Only Memory is another medium being explored at the National Agricultural Library. Working with both

OCLC and SilverPlatter, NAL has developed CD-ROM databases for AGRICOLA, the bibliographic database for agricultural materials maintained at NAL. Working with SilverPlatter and capitalizing on the tremendous storage capacity of the CD-ROM, 2.5 million AGRICOLA records have been stored on a set of five discs which also have room for continuing quarterly updates. Working with OCLC, over 1.25 million AGRICOLA records and 30,000 records from the Cooperative Research Information System (CRIS) have been stored on a set of two discs. Both these products are available on a subscription basis from the vendors, including quarterly updates. Both sets of discs are searchable using proprietary software which allows field specific or full-text searching using Boolean operators. CD-ROM searching is done on an IBM PC compatible microcomputer with 512 KB memory and one floppy drive, plus a CD-ROM player and disc.

The experiences with both digital videodisc and CD-ROM technology only reinforced the idea that optical technology has tremendous potential in the libraries of the future in terms of both preservation of materials and enhanced access to those materials. These experiences, together with new technological advances in data conversion, led to another project for capturing and distributing machine-readable text materials for agriculture.

NAL and forty-two land grant libraries have entered into a three-phase cooperative project to test a new method of capturing full text and images in digital format for publication on CD-ROM discs. Known as the National Agricultural Text Digitizing Project, it will evaluate a turnkey optical scanning system to determine whether it is now possible to provide in-depth access to the literature of agriculture while at the same time preserving it from rapid deterioration.

Phase I of the project will test the scanning system and a variety of indexing/search software systems. Once the scanning system is installed at the National Agricultural Library and a significant testing period is completed, work will begin on scanning a significant amount of agricultural material. Four thousand pages of the most important, noncopyrighted, aquaculture material will be scanned and digitized. Both the page images and the ASCII text will be mastered onto a CD-ROM using TEXTWARE software by UNIBASE.

The material for a second disc will be the most important papers on international agricultural research as determined by the Consultative Group on International Agricultural Research (CGIAR). CGIAR is an association dedicated to supporting a system of agricultural research centers around the world with the purpose of improving the quantity and quality of food production in developing countries. It is supported by the World Bank and the United Nations. Access will be provided by the KAWARE retrieval package by Knowledge Access.

A third CD-ROM disc will be developed as part of Phase I using the retrieval package Personal Librarian by Personal Library Software and

Phase I is to learn how to use the system, identify and correct any interface problems, and generally prepare for the remainder of the project. Part of Phase I activities will be to identify how best to scan different materials depending on age, condition of paper, type style, etc. The system is flexible in that each page can be scanned uniquely to ensure that the image of highest quality is captured.

Specifications for Phase 2 have been completed and the system will be installed in late 1988. In this phase more documents will be input and the workstations will be made available to researchers. The retrieval system, Personal Librarian by Personal Library Software, will enable researchers to select images via a variety of access points such as specific names, subject terms, or dates. Images can then be displayed at the high resolution terminals or stored for further use. System linkages will be established so the researcher can also access the campus mainframe computer, send images of particular documents to remote locations using telefacsimile capabilities, or print out documents of interest on site. In addition, the system will be linked to standard word processing software to enable researchers to use the system as a multipurpose workstation. Researchers will be able to make notes or commentary on the images they are working with by using a standard word processing package.

Phase III will be a further expansion of the system. This effort is scheduled to begin in 1989 and will include digitizing color images and sound recordings. Further retrieval enhancements will allow remote access to all aspects of the system.

University of Vermont

The establishment of the Automated Reference Center (ARC) is the University of Vermont Bailey/Howe Library's creative approach to utilizing optical technology. Established in 1986, the Automated Reference Center was designed as an end-user search facility and is located in the reference area at the Bailey/Howe Library.

The ARC offers access to WILSONDISC indexes on CD-ROM (Readers Guide, Humanities Index, Social Sciences Index, General Science Index, Applied Science and Technology Index, and Business Periodicals Index); SilverPlatter databases on CD-ROM (ERIC, Psyclit, and AGRICOLA); online services (BRS/AfterDark, Dialog's Knowledge Index, and the Dow Jones News Service); as well as access to LUIS, the University of Vermont's online catalog. Initially, INFOTRAC, which utilizes digital videodisc for storage, was offered instead of WILSONDISC. However, this was dropped in mid-1987 because of the need for a more comprehensive set of databases. Additional optical products will be added to the ARC as appropriate subject databases become available.

The ARC searching center contains IBM PCs, AT&T 6300s, and Hitachi CD-ROM players and printers. There are three WILSONDISC

drives and an optical disc subsystem with two Optimem 1000 optical disc drives which handle twelve-inch write-once-read-many optical discs. Approximately 4000 compressed images can be stored on the system. The scanned images are selected and displayed using a high resolution CRT from Terminal Data Corporation. A high resolution Xerox Printer is part of the display system. A page scanner and a book scanner are also part of the system configuration.

The document capture subsystem scans and digitizes printed documents at a density of 200 DPI. The subsystem can handle both looseleaf pages and bound books. The looseleaf scanner, which is commercially available, scans at the rate of one page per second and will capture material on both sides of a page automatically. The book scanner, which was designed at the Lister Hill Center, is a very exciting part of the project. This innovation at NLM has great potential for increasing the effectiveness of scanning technology for capturing library materials. One of the drawbacks of current scanning technology is the inability to handle bound material.

The book scanner was designed around a split tray book holder which allows the book to be placed face up for scanning. A glass cover flattens the pages and holds them in place. After both pages are scanned at 200 DPI, the glass cover is lifted and the page turned and flattened for the next scanning operation.

Once captured, the page image is sent to the image handling subsystem for quality control. A variety of techniques have been developed by project staff to enhance image quality. These include gray scale processing, image centering, and removal of image "noise." Rescanning is performed as necessary. When image enhancement is completed, the images are copied onto optical disc for long-term storage.

The display subsystem is a hybrid. It offers stand-alone access directly to the images through a unique identification number. In addition, there is an automatic link between the NLM Medline and Catline databases using the Grateful Med, a user-friendly front end interface, so that a bibliographic search can result in an image display from optical disc. The searching workstation is an IBM PC/AT compatible microcomputer with a high resolution monitor. Users can browse through images on the terminal screen or print high resolution copies.

At this time no conclusions have been drawn as to the effectiveness of optical discs as long-term archival storage. However, much has been learned about the operation of such a system and the hardware and software enhancements necessary to develop a production version of the prototype system.

The National Library of Medicine has also been working with CD-ROM technology as a means of distributing parts of the Medline database. In 1986, NLM signed experimental nonexclusive licensing agreements with several commercial firms including Disclosure, Silver-Platter, DIALOG, and ARIES to develop CD-ROM products for medical

information. Because of concern over the quality of the data and the effectiveness of presentation, NLM retained the right to review all products prior to release by the vendors. NLM has organized the evaluation of these products at a variety of test sites around the country including the New York Academy of Medicine, Meharry Medical College, and the University of Texas at Dallas. The experimental phase is due to end during 1988, although many vendor agreements will be converted to paid licenses to ensure the continuation of product availability. The results of the study were made available during a Medline CD-ROM Conference at NLM on 23 September 1988. Both CD-ROM vendors and staff from participating libraries were represented at the conference.

LIBRARY NETWORKS

Both national and regional networks are becoming involved in the use of optical technology. Some are actively developing optical disc products based on their online databases while others are acting as distribution agents for various optical products developed by the vendor community.

OCLC

OCLC is very active in the application of optical technology to library products. Foremost among a variety of projects is the CD-ROM retrieval system, Search CD450. What began as a research project has progressed to the point where a variety of CD-ROM products are now available to users.

Search CD450 is a microcomputer-based retrieval system for bibliographic data on CD-ROM. Currently, three broad categories of bibliographic data are available for purchase in multiple disc sets: education, agriculture, and science and technology. Each of these subject sets includes a reference database with both current and retrospective citations and a special subject-oriented selection of records from the OCLC Union Catalog. Each set of databases is updated on a regular basis.

The Search CD450 software was developed specifically for use with CD-ROM technology. It has a sophisticated searching capability which allows users to search a variety of fields of a record including author, title, and subject. Boolean operators can be used for complex searches as well as positional operators such as adjacency, truncation, and range searching on fixed fields. Search results can be displayed in a number of formats and printed as required. Additional capabilities include a search history function which enables a user to save previous searches for later use as well as the ability to download selected records for subsequent manipulation on a microcomputer. This system will run on a variety of equipment including IBM PC-XT or AT or compatibles and OCLC M-300 XT and M-310 workstations with 512K RAM, a hard disk drive, and CD-ROM player. A printer can be attached to the system. It is

also possible to attach up to four Hitachi CD-ROM drives to the system simultaneously. This will greatly facilitate access to multiple disc databases. With the variety of CD-ROM products under development, OCLC has become a leader in the development and distribution of CD-ROM products for the library community.

In addition to developing subject oriented products on CD-ROM, OCLC has also announced a cataloging system on CD-ROM which became available in mid-1988. This cataloging system, known as CAT CD450, contains two collections of the most frequently used bibliographic records from the OCLC database and a collection of name and subject authority records. The Current Cataloging Collection includes approximately 1.4 million book records published from 1980 forward and 1.4 million nonbook records plus book records with pre-1980 imprint dates. The Authority Collection includes approximately 1.8 million LC name and subject authority records. Plans call for updating the bibliographic collections quarterly and the authority collection semiannually.

CAT CD450 was designed to work on an OCLC M-300 or M-300 XT workstation with a 20 megabyte hard drive and a CD-ROM reader. In addition, there is a communication capability to enable the system to look into the OCLC online system when necessary. When a desired record is not found on the CAT CD450, disc users can automatically search the online system. The system also has the capability to download records for local card production.

Western Library Network

The Western Library Network (WLN), using a grant from the Fred Meyer Charitable Trust, has developed a CD-ROM product based on their online bibliographic database. This product, known as LaserCat, consists of three CD-ROM discs containing over 2 million bibliographic records from the WLN database as well as the most current two years worth of records from the Library of Congress. Holdings information for WLN members is also included. All records are in full MARC format, and the set is updated quarterly throughout the year.

The equipment required to use LaserCat is an IBM PC, XT, AT, or compatibles with 512 RAM memory and two floppy disk drives. Two CD-ROM players are required. The system supports Hitachi CDR-2500 or CDR-1503S, or Sony CDU-100 drives. An IBM compatible printer can also be used with LaserCat. The software required is DOS 3.1 or higher and a Meridian device driver. The software used to access the CD-ROM was developed by WLN, but can be licensed for use in developing other CD-ROM products. The retrieval software is very user friendly with easy to follow menu screens. Access points include author, subject, and title, and Boolean operators can be used to link up to two search terms per search. It is also possible to limit searches based on language, date, material type, specific library, etc. All aspects of the

system, including the software, are fully described through extensive use of help screens.

In addition to being used as a public access catalog, LaserCat also includes the capability to print products for use at local sites. These include card labels and bibliographies. In addition, records can be downloaded for use in local systems. A special feature of the system allows for retrospective conversion by member libraries. Local users can add their locations to the database by recording the information on a floppy disk and forwarding it to WLN for inclusion on the database and, hence, for the next update of LaserCat.

LaserCat distribution started with approximately 100 of the 350 WLN libraries and is now up to over 250 subscriptions. LaserCat has been found to be so effective that it will be made available to high school libraries as well as public and academic institutions. A second grant from the Fred Meyer Charitable Trust is making possible an evaluation of LaserCat in the high school environment. Nine high schools in four states will be installing the CD-ROM database for evaluation purposes.

ACADEMIC AND PUBLIC LIBRARIES

There are numerous optical disc application activities underway in the academic and public library communities. They range from installation of end-user CD-ROM workstations to the evaluation of write once optical discs for full-text retrieval. The applications described here show the variety of approaches being taken to the application of optical technology and are by no means the only ones underway.

Syracuse University

The Department of Media Services at Syracuse University has a project underway using optical disc technology to enhance access to their collection of adult education materials. Called the Kellogg Project after its funding agency, the Kellogg Foundation, Syracuse has defined a three-phase project utilizing a computer system developed by Plexus Computers, Inc. This information system will give researchers electronic access to all materials held in the Adult and Continuing Education Research Collection at Syracuse.

The Plexus System was selected after an extensive effort to develop system specifications and carefully evaluate vendor systems. The system consists of a P95 supermicrocomputer with an optical disc player linked to four workstations, two scanners, and two printers. The system will scan and digitize printed material in the collection and store a compressed version of the digitized page images on a twelve-inch write-once-read-many optical disc. As pages are scanned, indexers will input records of descriptive information for each image using the workstations. These records will be used to provide access to the page images.

Phase I of the project is well underway. The equipment was installed in November 1987 and is being tested. The primary focus of

Phase I is to learn how to use the system, identify and correct any interface problems, and generally prepare for the remainder of the project. Part of Phase I activities will be to identify how best to scan different materials depending on age, condition of paper, type style, etc. The system is flexible in that each page can be scanned uniquely to ensure that the image of highest quality is captured.

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stations including microcomputers and CD-ROM players and printers for use with the WILSONDISC indexes. There are four microcomputer stations with printers for the three online services—BRS/AfterDark, Dialog's Knowledge Index, and Dow Jones News Retrieval Service. In addition, each of the SilverPlatter CD-ROM databases has its own workstation, and a final CD-ROM workstation with a printer is reserved for testing new products.

One of the most interesting aspects of the Automated Reference Center is the approach to training. Patrons are expected to complete a training program in database searching before using any of the ARC resources except WILSONDISC or Dow Jones. This is primarily because of the complexities of database searching and lack of effective system tutorials as well as the expense of inefficient online searching. The patron has the choice of completing a training workshop taught in-house or completing a computer-aided-instruction (CAI) program and a workbook. The training room contains five microcomputers—four AT&T 6300s plus a COMPAQ—and a computer projection system.

After one and one-half years in operation, the ARC is judged to be a success. It is very popular with both faculty and students. The total number of ARC searches done for fiscal year 1987 was approximately 3000. In addition, mediated searching has decreased and there has been a substantial increase in interlibrary loan requests based on computer searches. Preliminary analysis has shown that the fixed cost of CD-ROM products results in a low per unit cost when the product is heavily used. The result is better library service for less cost.

Cornell University

The Mann Library at Cornell University is taking a slightly different approach to the use of optical technology in that it will be integrated with the centralized computer center. With the increasing use of microcomputers on the campus plus the variety of databases available in electronic form, Cornell is concerned about getting appropriate information to the researcher in electronic form. The university computer center and the campus network will be the focal points of this four-phase project to assess the potential of write-once-read-many optical technology to deliver both bibliographic and textual information to the researcher.

Phase I of the project, which began in 1987, was identification of funding and the establishment of a hardware and software system to support networking as well as a database management system to provide a database structure and indexing capabilities to facilitate access to large text files. The system chosen was a Microvax Minicomputer with the BRS/Search software package by BRS Information Technologies used for database maintenance and searching.

In Phase II, which began in March 1988, the full AGRICOLA database was loaded onto magnetic discs using the BRS software pack-

age and the Microvax Minicomputer. AGRICOLA is the bibliographic database developed and maintained at the National Agricultural Library. This database has been made available to a limited number of Cornell faculty for testing through the campus network. Plans are underway to make additional bibliographic databases of scientific information available in late 1989.

Beginning in late 1989, Phase III of the project will begin to provide full text through the system. Material from selected journals cited in AGRICOLA will be stored on WORM discs and indexed for full-text searching. BRS/Search will continue to be used for the full-text retrieval and users will be able to search, display, and print full-text information as well as high-resolution page images. These materials will be delivered through the campus network to a high resolution terminal at the researcher's disk. At the completion of this project, Cornell expects to have determined how best to provide library service for electronic databases to the scholarly community in a campus environment.

One of the most exciting approaches taken to the use of optical products in libraries is the various statewide programs which aim to provide a basic automation capability to libraries by utilizing CD-ROM technology.

Missouri

The Missouri State Library has utilized Library Services and Construction Act (LSCA) funds to provide any public library in the state with funds to purchase automation equipment. By meeting a set of specific requirements, including voted tax support, completion of an annual report to the state library, and agreeing to purchase specific equipment, over 180 libraries will be acquiring equipment in 1988.

Specific equipment is required to ensure compatibility among libraries. The equipment includes the Epson Equity microcomputer, the Hitachi 1503-S CD-ROM player, a Hayes 2400 baud modem, and Smartcom software as well as a Hercules Graphics Card. The State Library is coordinating the distribution of equipment and special training sessions which will be held at various locations around the state.

The State Library is also supporting the conversion of local bibliographic records to electronic form. This will be done using *Bibliofile*, a product of The Library Corporation, and the purchase will be supported by state funds. *Bibliofile* is a CD-ROM product which supports retrospective conversion by enabling users to select, modify, and output MARC records from the CD-ROM database. *Bibliofile* was selected because of its strong reputation and the fact that many Missouri libraries already owned the package. Using local records, the State Library has plans to create a statewide database on CD-ROM. It is scheduled for completion by October 1988.

This is by no means the end of the project, however. Other software and CD-ROM products will be identified for use by participating libraries over the next few years and purchased as appropriate.

Pennsylvania

ACCESS PENNSYLVANIA is another statewide project utilizing CD-ROM. Unlike the Missouri project, which involves public libraries, the Pennsylvania project focuses on school libraries. This project is the joint effort of the Pennsylvania State Library, the Pennsylvania Department of Education, and the BroDart Company. The purpose of the project is to create a Pennsylvania Union Catalog utilizing microcomputer and CD-ROM technologies. Funding for the project is a combination of state, local, and federal funds used to support database development, retrospective conversion, and mastering and copying of CD-ROM discs.

While the primary focus is on school libraries, other libraries are also included if they form a consortium with a school library. There are a number of requirements for participation, but primarily a participant must purchase the microcomputer and related hardware and software needed to use the CD-ROM Union Catalog. In addition, they must implement an automated library management system for inventory and circulation control. Participating libraries must also agree to support the cost of updating and remastering the database for a five-year period as well as supporting the cost of interlibrary loan activities from their collections.

The equipment used for ACCESS PENNSYLVANIA is basically the BroDart Le Pac System. The hardware includes a Tandy 1000SX microcomputer with two Hitachi 2500s CD-ROM drives. The Le Pac software supports a public access catalog with full MARC records and provides a variety of access points including author, title, and subject headings. A special search capability for the location field was added for the project in order to facilitate interlibrary loan activities.

As with the Missouri project, retrospective conversion of cataloging records was a large part of the effort. Over 150 participating libraries provided unique cataloging records to the Union Catalog database. For cataloging records not already in electronic form, a contract was made with BroDart for retrospective conversion, a process which will result in a database with full MARC records. The first CD-ROM database was delivered to participating libraries in September 1986. A new database with approximately 1.4 million records from over 200 libraries was delivered in September 1987. This latest version required two CD-ROM discs and some software enhancement for facilitating access to the two-disc set. The database will continue to be updated annually.

Support services such as software testing, coordination of retrospective conversion, contract negotiation, and training for participants are all coordinated by the State Library. The State Library is also involved in planning and coordinating ongoing efforts to improve and enhance the overall project.

Although a formal study of the project is underway, a number of positive project results can be seen. Circulation has increased in a

number of participating libraries due to the user-friendliness of the CD-ROM catalog. Some libraries have indicated that their image has been enhanced in the eyes of users as a result of their participation. Others indicate that expanded interlibrary loan activities are providing outreach services which will bring future benefits, and, most important, students are having positive library experiences.

Maine

Another approach to statewide library service using optical technology is underway in Maine. While Missouri focused on public libraries and Pennsylvania focused on school libraries, the Maine state project, MAINECAT, anticipates participants from public, school, special, and academic libraries.

The Maine State Library Bureau took a legislative approach to statewide library automation. Legislative Document No. 321 entitled "An Act to Open Maine Libraries to Modern Information Technology" was introduced into the Maine House of Representatives in February 1987 and soon passed into law.

The purpose of the MAINECAT Project is to improve library service within the state of Maine through the use of microcomputers and CD-ROM technology. The project is directed by the Ad Hoc State-wide Library Automation Committee. Fifty libraries will be selected on a competitive basis to participate in the first year of the project. Selection criteria include such things as readiness to undertake automation projects, financial ability to acquire compatible microcomputer equipment, willingness to convert local collections, and willingness to provide access to collections. Each participating library will receive a CD-ROM drive and a \$500 grant to be used to purchase a microcomputer system.

The equipment to be used for the project has yet to be identified. A Request for Proposal (RFP) detailing the requirements for MAINECAT has been completed and made available to the vendor community. Appropriate equipment will be identified in the winning proposal.

MAINECAT will be a Maine Union Catalog of full MARC records including more than 1.5 million existing records in electronic form. Each record will include local call number and location information. Once the project is underway, new records will be added to the MAINECAT database on a regular basis, and a new CD-ROM will be issued semiannually. In addition to its use as a Maine Union Catalog, MAINECAT can also be used as a "scoped catalog." By "scoping" or limiting, the database can be used as a local library catalog.

The State Library will provide coordination for the MAINECAT project in terms of database development, training, and general educational programs. In addition, the state will support the cost of CD-ROM readers for participants, processing of existing records to create the initial MAINECAT database, and the CD-ROM mastering and

duplicating. Ongoing database maintenance costs will also be supported by state funds.

With a three-year planning effort completed, the first MAINECAT disc will be distributed to participants in March 1988 with full software implementation expected in fall 1988. It is expected that fifty additional libraries will be added during the second year of the project and additional libraries thereafter.

SUMMARY

CD-ROM, digital videodisc, and WORM are the three types of optical media being used today in the nation's libraries. Much of the present use is to provide existing products in an alternative format. Hence, online databases or printed indexes become available on CD-ROM discs. However, a number of vendors are starting to experiment with new products which do not exist in other formats. There is a new focus on text products as distinct from bibliographic products, thus helping to direct the library community toward alternatives for the delivery of information.

Considering the relatively short time-frame since the introduction of optical technology, the number and scope of activities—both operational and experimental—in the nation's libraries is indeed astounding. It is clearly a technology whose time has come and with a little help and direction from the library community it can become a major factor in the way libraries do business in the twenty-first century.