Planning for the Introduction of CD-ROM at the University of Technology, Sydney

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The first section of this article presents an overview of CD-ROM technology and the issues confronting libraries. The second section suggests a model for the integration of the technology with the existing library environment. It explores the possible application of this model for a library in an online network, using the proposed CLANN Network Catalogue on CD-ROM as an example. The article concludes with an extensive bibliography.

BACKGROUND TO THE TECHNOLOGY AND ISSUES

Introduction

The University of Technology, Sydney (formerly the New South Wales Institute of Technology) is a medium size university located close to the central business district of Sydney. Since its establishment in 1972, the University Library has used the adoption of appropriate technology as a major strategy for achieving its goals, including the support of teaching and research and the promotion of effective use of information.

Central to this strategy has been the University's membership of the CLANN Library Network. Since 1978 the University Library has had access to a shared cataloguing database and a public catalogue in microfiche format. In 1985 the network purchased and installed Geac integrated library system software. The public access online catalogue, circulation and cataloguing modules were imple-

mented between 1985 and 1987 and trial of the acquisitions module will take place later in 1988.

The University Library has a collection of materials in diverse formats including print, microform, audiovisual and electronic. Machine readable bibliographic records exist in the online catalogue for all of its holdings. The subject liaison and reference services use a wide variety of Australian and overseas database services on a cost recovery basis to retrieve relevant citations and information for users.

The introduction of the CD-ROM format provides the library with a new technology for evaluation and possible use in a wide variety of contexts.

CD-ROM Format

There is already a large literature on both the technology and application of CD-ROM (Compact Disk-Read Only Memory). Several excellent publications dealing with the technical description of the format already exist.[1]

In summary, the CD-ROM disk can be described as a mass storage device designed for use in the personal computer environment. Each disk has a storage capacity in excess of 500 million bytes and can contain data in multiple formats (text, audio, video, etc.). As a physical medium, the CD-ROM disk is sturdy, non-erasable, mass replicable and easily distributed. Linked with a CD-ROM drive, a personal computer and appropriate operating and search software, CD-ROM can also provide users with an effective means of information retrieval.

CD-ROM Products

Since the launch of the first commercial product early in 1985, over 200 different CD-ROM products have been introduced to the market and more than 200,000 drives have been sold worldwide[2].

However, even a superficial examination of some directories of CD-ROM products[3] shows that there are almost no "new" products. The data contained on the disk is usually available already in another form - print, microform, online. The CD-ROM format is being used to repackage information for a variety of markets including those users who already have access to the other forms. How can this marketing exercise be successful?

Part of the answer lies in the fact that CD-ROM is an excellent example of convergent technology. The impetus for its development has come from progress in a number of diverse fields including computing, sound recording, television and photonics (the science of light). The result has been a technology which provides

both the mechanism for efficient and secure storage of a huge quantity and variety of data and also an effective means for retrieval of the data. The notion of convergence extends to many of the CD-ROM applications because a mechanism for manipulation of the data retrieved has also been included as part of the product package.

Library Applications of CD-ROM

Existing library applications of CD-ROM can be divided into four broad categories:

1. Support for acquisitions and cataloguing functions through provision of standard bibliographic descriptions of items. Beyond the storage and retrieval of appropriate records, these products tend to offer facilities for downloading of records to local formats, electronic ordering, production of catalogues and spine labels, etc.

2. Full text or non-bibliographic data products including dictionaries, encyclopaedias, thesauri, statistics, directories, company information, art catalogues, clinical information and journals. As well as data storage and retrieval, products in this category tend to provide facilities for data manipulation - statistical computation, mapping - and for downloading to other PC tools like word processors and spreadsheets.

3. Reference databases provided by a wide range of online vendors and database suppliers as an adjunct to their online or print services. In addition to providing a powerful retrieval software, many of the vendors, e.g. Dialog, Wilson, provide communications software and a save search facility so that users can make a "seamless" connection to the online service to update their CD-ROM search. To date it has been largely the public domain, high use, wide application database category that has been produced in this format.

4. Public access catalogues are beginning to emerge as a viable application for CD-ROM.[4] Apart from record storage and retrieval, some products provide for the inclusion of local library information and for new approaches to catalogue education, e.g. audio tutorials.

Issues

The CD-ROM format is an economic proposition when there is a need for secure storage of large amounts of relatively static data which receives repeated use. Its true value, however, lies in the potential for enhanced retrieval and possible integration with other products or tools, but there are several important issues that need to be addressed before the CD-ROM format will fit comfortably into the library environment.

Standards

Many reports on the installation of CD-ROM highlight the difficulties associated with the early lack of standards. The consensus view is to avoid products which do not conform to all of the agreed standards. The elements of CD-ROM systems and the progress towards standardization are set out below.

Disks : Both the physical format (Philips and Sony licence) and the logical format (High Sierra code) now have agreed worldwide standards.

Disk players : Disk standards do not dictate how a drive should perform, and there are no agreed standards. Some products are designed to be played on only one type of drive.

Disk player/PC interface : Because of problems with RS232, the emerging standard is SCSI (Small Computer Systems Interface) which will operate with virtually any PC. However, several different interfaces are still in use.

PC compatibility : Many problems have been experienced by owners of IBM PC clones which turn out not to be fully compatible with some part of the CD-ROM package. Now that Apple have entered the CD-ROM drive market, this problem may be repeated with any future Apple clones.

PC operating system : PC-DOS and MS-DOS were not designed to handle very large file sizes or to recognize a variety of external devices. Both of these problems are now being addressed by designers of operating system software and the solutions are being made available to the CD-ROM publishers.

Software and file structure : The data on a CD-ROM are stored and accessed in a different way from the data on a magnetic disk. Some concern has been expressed about the response time problems that may be encountered when accessing a very large file with retrieval software designed to work with smaller storage media. Most retrieval software has been designed to emulate the functions and features of the major online mainframe packages. There are no standards because the structure and size of the file should dictate the most appropriate software type to be used. The lack of standards does mean, however, that users of multiple products may need to contend with software packages that are just different enough to cause confusion.

Many products have been marketed as a total package (hardware, software, disks) because of these problems and because of the close relationship between all of the elements in the package.

Copyright

For disk publishers, the production process involves making a copy of the original data and this can constitute an infringement of copyright if the publishers are not the copyright holders.

For disk users, copying and downloading of data can also constitute an infringement, depending on the purchasing agreement signed. Copyright and 'fair use' of electronically stored information is at best a grey area of the existing law and there are no standards for publishers to follow when expressing terms and conditions of product use.

There is some built-in protection for CD-ROM publishers because it would be almost impossible for a user to make a complete copy of the product to either hard or floppy disk. Some publishers are also using the technology to electronically 'poll' the use of items on the disk, so that appropriate royalties can be collected as part of disk licensing and distribution agreements.

User Access

Multiple users : CD-ROM is designed to function in the personal computer environment. As the PC itself functions best as an 'only one owner' tool, problems can arise from multiple use in a public space. Some of the issues are: PC security, including need for access to a floppy drive; cost and use of printers and consumables, paper loading, noise; controls on the length of a search session; need for staff and user training; staff time and expertise required for user assistance and PC troubleshooting/supervision.

Multiple products : Other problems arise from the need to store and change multiple disks in a drive. Hardware developments to assist in this area include a jukebox to automatically change disks; and daisy chained drives so that more than one disk can be accessed at a time.

The consensus opinion at present is that networking several PCs to one drive will slow down the response time to unacceptable levels. Info-trac and Online Computer Systems OPTI-NET network are examples of possible approaches in this area.[5]

However, any form of networking adds another level of complexity to the system and the costs and benefits would have to be assessed carefully.

Updating

The most frequent criticism levelled at the CD-ROM format is that a disk cannot be updated without complete replacement.

Provided that the equipment can be secured in some way to survive the rigours of multiple use, this 'permanency' feature can actually be a boon to libraries only too familiar with vandalized paper copy, reformatted hard disks and mutilated or erased floppy disks!

The updating issue has been addressed by producers in a number of ways. It may be irrelevant if the data released is static and complete, e.g. Census data for one collection period. Data may be replaced - remastered at regular intervals depending on relative costs and frequency of data changes. Supplements may be issued on CD-ROM, hard disk, floppy disk or microform. Or else, integration may be achieved by connection with an online host for updating of the CD-ROM information.

A PLANNING MODEL

Elements of the Model

Given the range of products and the associated issues, how will CD-ROM fit into the University Library environment, bearing in mind our commitment to the network integrated system?

There are several excellent papers which describe the planning and evaluation process.[6] The following areas are central to any model:

Library goals : The introduction of CD-ROM technology will assist in the achievement of library goals in a number of ways, including: provision of access to items currently not held in the collection; stimulation of interest in and use of databases; potential for education of users in the information retrieval process; and extension of services outside the library.

Collection development policy : Any CD-ROM products purchased need to be assessed according to their relevance to users, content, scope, frequency of updating, price, availability of other formats, etc.

Microcomputer management policy : The University Library requires a microcomputer management policy to deal with questions of hardware selection and compatibility, security, use schedules, staff and user training. Such a policy needs to take account of existing University guidelines regarding equipment purchase and microcomputer usage.

Product evaluation : Products should be evaluated by live trial or demonstration. Purchasing decisions should take account of such areas as the features and 'commonality' of the retrieval software, vendor support and documentation, how easy the product is to use, adherence to CD-ROM product standards, copyright and updating methods.

There is another element needed to complete the model in our context:

Network relationships : Examples of questions to be addressed in this category are:

> Are there any benefits to be gained from co-operative bulk purchase of products?
>
> What are the alternatives for use of CD-ROM products along side the online system?

There has already been some discussion in the literature of the relationship of CD-ROM technology to online networks.[7] The most common comment is that this will depend on the nature of the online network and that the likely future is one of co-existence with some mix of central and local processing of data. A good example of this mix is provided by the reference database products which allow the user to perform the initial search at leisure without the pressure of mounting connect or telecommunication costs. The search is then updated against the online version of the file. This approach captures the advantages of CD-ROM technology without compromising currency or completeness of retrieval.

Is there scope for this approach within the CLANN Online Network?

CLANN Catalogue on CD-ROM

Supported by research funds from the NSW Department of Technical and Further Education (a network member), the CLANN Office has begun investigations into the feasibility of producing the CLANN Catalogue on CD-ROM.

At present, Author/Title/Subject COM fiche catalogues are produced to serve three major needs: catalogue access for libraries not yet implemented online; backup when the online is down; and additional catalogue access in peak periods.

The CLANN online catalogue is comprised of three major data sets:

. Bibliographic records containing relatively static information (given quality control through network standards and authorities). Approximately 10,000 new records are added per month.

. Holdings records containing relatively dynamic information. Changes can occur to call number, location, material type, etc. according to an individual library's requirements. Over 30,000 new holdings are added per month.

. Status information is dynamic for those items which circulate. Changes can

occur to the status in a matter of minutes. More than 150,000 circulation transactions per month affect the status of items.

Searches of the online catalogue (over 70,000 per month) access these three data sets and make economic use of a single bibliographic file. Availability of holdings and status information enhance resource sharing through interlibrary loan and reciprocal borrowing.

The CLANN catalogue clearly fits into the large database/high use category, making CD-ROM an attractive storage format. Use of this format immediately raises the question of updating and of the currency of the information retrieved, depending on the product model chosen.

PRODUCT MODELS

Three approaches are presented for a CD-ROM version of the CLANN catalogue, stand alone, 'networked' and integrated.

1. **Stand alone:** Each PC is used as a separate workstation with one CD-ROM drive providing:

(a) Backup

Backup to the online catalogue as a substitute for existing fiche catalogues (assuming author, title and subject access only); and as a disaster contingency (when online or telecommunication link is unavailable).

Capital Cost :

CD-ROM workstation (without printer - bulk contract price)	$5,000
Microfiche workstation	$500

Recurrent cost : The CLANN proposal suggests that, initially, disk costs and fiche costs will be roughly equal. However, disk production costs are falling and fiche costs are rising. Maintenance costs for the PC and drive are likely to be higher than for fiche readers.

Staff costs : Staff time now consumed in fiche tidying may be transferred to PC troubleshooting and user instruction.

Even if the Brodart estimate[8] of one CD station to every one and a half fiche stations is correct, the high capital cost does not justify CD as a straight replacement of the fiche. To be a viable alternative, there must be some value added.

(b) Value-added: Extension of Service

In library:

provide additional 'terminals' at peak use times with no effect on online response time;

provide 'terminals' for hands on reader education, independent of online response time.

In institution:

additional 'terminals' at other locations without the need for cabling, local area network, or dial-up access, e.g. student information centres, small, remote sites;

utilization of existing PC installations in other areas, e.g. PC labs, terminal rooms, academic offices.

Outside network:

marketed to other libraries to facilitate interlibrary loans and to decrease requests for items not held in the collection.

(c) Value added: Enhancement of Services

Increase search options

- multiple keyword
- Boolean searching
- tables of equivalence (spellings, etc.)
- limiting by format, location grouping, date of publication
- thesaurus substitution or an 'index of indexes' to help prevent search failure
- shelflist browsing.

Provide network information

- explanation of CLANN network library names and addresses
- location codes and names

Provide local library information

- library hours
- book locations (including maps)
- library policies and service guides
- library news and contact list
- reference guides and bibliographies

Provide reader education and catalogue help

- audio tutorial (via headphones)
- explanation of catalogue coverage
- explanation of search types
- explanation of subject headings and the classification.
- provide for manipulation of search results
- downloading of records to floppy disk or printer.

2. 'Networked'

(a) several PCs linked to one or several drives;
(b) one PC linked to several drives.

The first section of this paper has dealt with the likely impacts of 'networking' either PCs or drives. However, the CLANN Catalogue file is so large that some consideration will have to be given to options for file compression or expansion to other disks, such as, short records only (less MARC fields); and/or division by format (serial, A/V, monograph), date of publication, for loan/not for loan, or frequency of record usage.

Apart from the obvious need to conform to existing CD-ROM standards, the success of the two product models outlined above depends largely on the economics and frequency of updates. From a library management viewpoint, the only viable option for updating under these models would be remastering and reissue of the disks on a regular basis. Updates to online catalogue records and holdings occur on a weekly cycle. Quarterly or even monthly updates of the CD-ROM are still a compromise for the user familiar with the online file and its status information. To be fair to the CD-ROM format, however, there are perennial problems in the online catalogue environment as well - constant demand for more terminals and a corresponding increase in usage for each improvement to the response time.

For these reasons, the third product model discussed below is seen as the most viable in the University Library.

3. Integrated

This model is suggested by the databases now povided on CD-ROM by companies like Dialog, Wilson and Dow Jones. CD-ROM versions of their databases are provided without compromising the currency of data because of a transparent interface with the online file which can be used to update the search already conducted. The search software used on the CD product works in the same way as that used to access the online file.

This integrated approach could be achieved in the online catalogue environment through the following structure:

. Each public catalogue terminal is a basic CD-ROM PC workstation with its own copy of the most recent update of the CD database. (Updates may only be needed every six months.)

. This file is the first accessed by the search software on the PC/CD, which resembles and is compatible with the search software used in the online catalogue.

. The user can elect to store the search strategy and results for execution in the online file to determine: additional relevant records added since the last update; the status of all items retrieved (which would include changes to holdings since the last update).

. The results can be downloaded to a printer or to floppy disk.

The immediate advantages of this approach are:

. distribution of the processing load with a consequent decrease in load on the central online system;

. CD-ROM update frequency is less critical;

. the possibility of a mixture of stations that have or do not have online access and/or other PC tools available;

. ability to use the PC as an 'intelligent' device for local instruction in catalogue use.

The success of this model is dependent on an efficient interface or gateway for the transfer of data between the local workstation and the network host.

Extension of the Model

This integrated approach could also be extended to other library applications. An Interlibrary Loan workstation could have access to the CLANN Catalogue, other CD-ROM library catalogues, online circulation, ILL record management software, electronic mail and fax facilities. Some mix may also be possible between CD-ROM products and the use of the online modules for access to bibliographic data for acquisitions and cataloguing.

The integrated model would also provide for the future incorporation of other CD-ROM products for both database access and document supply, e.g. a PC/CD station with access to the CLANN Catalogue on disk and online, MEDLINE on disk and online, and the ADONIS group of full text journals.

With the addition of literature management software and a word processing package, this model is then well on the way to the dream of a 'memex' or 'scholar's workstation'[9]. It also works towards the provision of an expert system or 'intelligent front end' capable of analyzing a user's request and of determining the database or databases that will supply the most complete answer.

For these reasons, it is our preferred model for the adoption of CDROM. The integrated approach maximises the potential of the new technology to provide users with more efficient access to information from both inside and outside the library.

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[1] See Bibliography 1: Background articles and books

[2] Herther, N.K. 'How to evaluate reference materials on CD-ROM'. *Online*, v.12 no.1 (March 1988): p. 106

[3] See Bibliography 2: Directories and product reviews

[4] See Bibliography 4: Online catalogue applications

[5] Urbanski, J. 'CD-ROM takes center stage'. *Library Resources & Technical Services*, v.32 no.1 (January 1988): p. 14

[6] See Bibliography 3: Planning and evaluation

[7] 'Will optical discs be the end of online networks?' *American Libraries*, v.18 no.4 (April 1987): p. 253

[8] Stephens, A. 'CD-ROMS at ALA: a review of product developments from the American Library Association midsummer exhibition'. *Program*, v.22 no.1(January 1988): p. 78

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★★★ DATES FOR VALA ★★★

The Victorian Association for Library Automation has the following dates scheduled for 1988 activities :

August 10 - 5.30 for 6.00 pm - Telecom Research Laboratories Library 770 Blackburn Road, North Clayton - David Richards, of the Telecom Research Library will speak on the Library's use of the ADLIB computer system.

September 20 - 5.30 for 6.00 pm - Admin. Headquartrers of Melbourne City Libraries, 12-18 Myers Place, Melbourne - Ruth Cameron and Karen McCallum will speak on the Dynix system at Melbourne City Libraries.

October 12 - 5.30 for 6.00 pm - Probably in Telecom Theatrette, 199 William Street, Melbourne - Joint meeting with ADDA (Australian Database Development Association) on MEDLINE - with a panel of users and four suppliers.

The Annual VALA Award Dinner will be held in November, and those interested in details of it and of other VALA activities are invited to contact the VALA Committee, of which Doreeen Parker of the Footscray Institute of Technology Library (Tel. 03-6884352) is President and Michael Metcalfe of the Technilib Library Service Centre (Tel. 03-4295177) is Secretary.