ELECTRONIC LIBRARY - A MYTH OR A REALITY

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The emergence of new information technologies has great impact on the future of libraries in the electronic age. The present paper discusses various factors involved in transformation of traditional libraries into electronic one, the advantages of electronic library and also librarian's role therein. The Pilot Project at INSDOC for developing an electronic library is also mentioned.

INTRODUCTION

Necessity is the mother of invention. Customer's demands are the biggest driving force for the organisation of activities and changes in means of production of goods and services. The combined effect of computer and telecommunication has almost converted the world into an electronic village. It has changed the shape of things beyond recognition within a short period of a decade. The information sector has suffered the biggest mutation. People are generally discussing "will there be libraries in the electronic village?" [1]. "libraries without walls" are already talked about. The consumer demands are forcing the application of new technologies, new modes of access to knowledge stores and new techniques of knowledge search. Access to knowledge and assistance to its' access are the main functions of libraries that, perhaps, will determine their survival in the electronic age.

It is being mentioned that "because the focus of knowledge work is moving to the networked desktop and to other work places, the priority focus of library service should be on the places of delivery and less on the places of supply" [1]. People visit libraries to consult the access tools for information, i.e. to seek "information about information" and to physically possess the required published document. If both these requirements are satisfied at the desktop itself, the customer will not have a strong urge to visit the libraries. It is felt that there will be practically no visitors to the places called libraries in electronic age. The computers and telecommunications together will exactly be serving the customers in the way mentioned above at their desktop.

FACTORS OF CHANGE

A number of developments have taken place during last decades which have forced major changes in the information scenario including the library systems. The volume of information being generated around the world has brought a realization in the libraries that librarians simply cannot disseminate this huge mass of information manually. It has been estimated that one trillion pages of information was generated in USA alone in 1993 [2]. It may be safely assumed that USA produces only about 25% of world's total information output. Therefore, the total output of the world crosses 4 trillion pages in one year which is growing at the rate of 6 to 11% per year over the past decade. These mountains of paper documents have not only created the problems of their storage, miles of storage shelves every year, but also, exponentially increasing financial resources every year for the procurement of a very small fraction of total output in one's own area of activity apart from other.

SEARCHING PROBLEMS

Moreover, the users have been confronted with the problems of searching the required information may be of few pages only out of these trillions of pages. It has been estimated that on an average professionals spend only 5 to 15% of their time on reading, but upto 50% of their time looking for information [2]. With the emergence of information technology, it has been possible to store the informa-

tion in electronic form. The required information from the electronic databases can be accessed and retrieved quickly.

LOW-COST TECHNOLOGIES

The storage and maintenance of the huge mass of paper documents year after year have become extremely costly, time consuming and labour in-tensive. The storage and maintenance costs of paper documents is becoming more than their pro-duction cost. Moreover, the printing itself is one of the costliest option now available for distributing information. One megabyte of information on pa-per might cost, on average, $ 4, on diskette perhaps $ 1.7, and on CD-ROM might average $ 0.0024 or even less [2] (Fig. 1). One CD-ROM can hold 1500 floppy disks or 2.5 lakh pages of
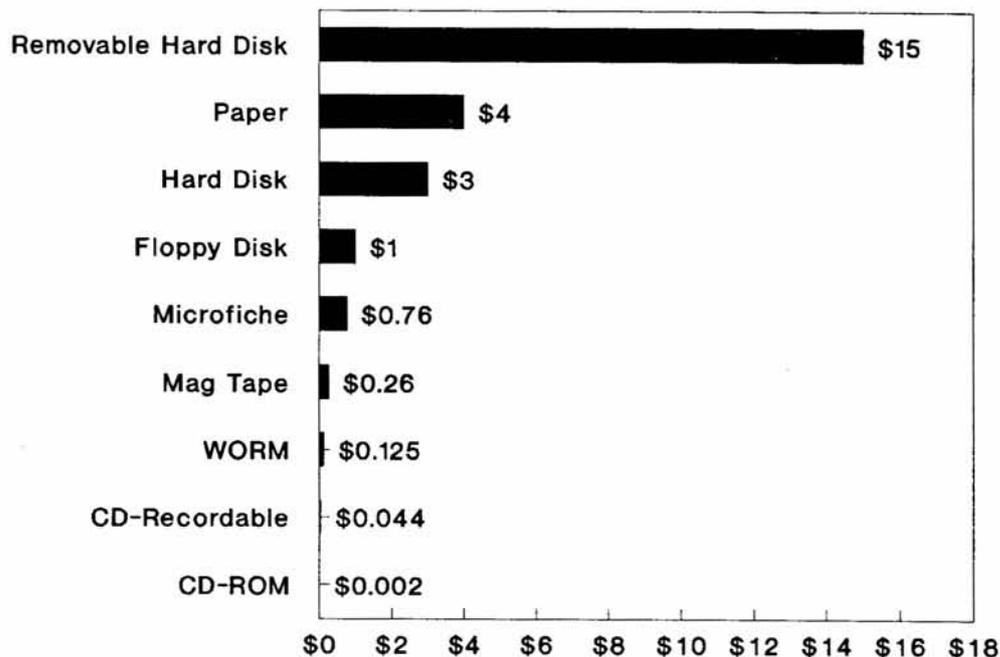

Fig. 1 : Cost per Megabyte

textual information or 12000 scanned images. The total cost of that CD-ROM might average $ 2. The cost of equivalent information on paper might be $ 1500 or higher. That is why more and more foreign publishers and information vending organi-sations have started producing bulk of their infor-mation products only on CD-ROM. Most of the abstracting and indexing periodicals are now avail-able on CD-ROM and the libraries as well as us-ers are very happy with their usage. Similarly, about 5000-8000 S&T full-text journals have also started appearing on CD-ROM and their subscrip-tion cost is 5 to 10 times less than their print ver-sion. This single factor is changing the shape of

existing libraries quite rapidly and it appears that by the end of the present century, CD-ROMs will replace a majority of paper documents from the shelves of some of the libraries in the country. The growth of CD-ROM Titles in the last few years is shown in Fig. 2.

ENVIRONMENTAL FACTOR

The environmentalists of the world have already started a major campaign in favour of digital pub-lishing on CD-ROM etc. The slogan "burn a CD-ROM, save a tree" is catching the imagination of the people fast, as the electronic publishing has
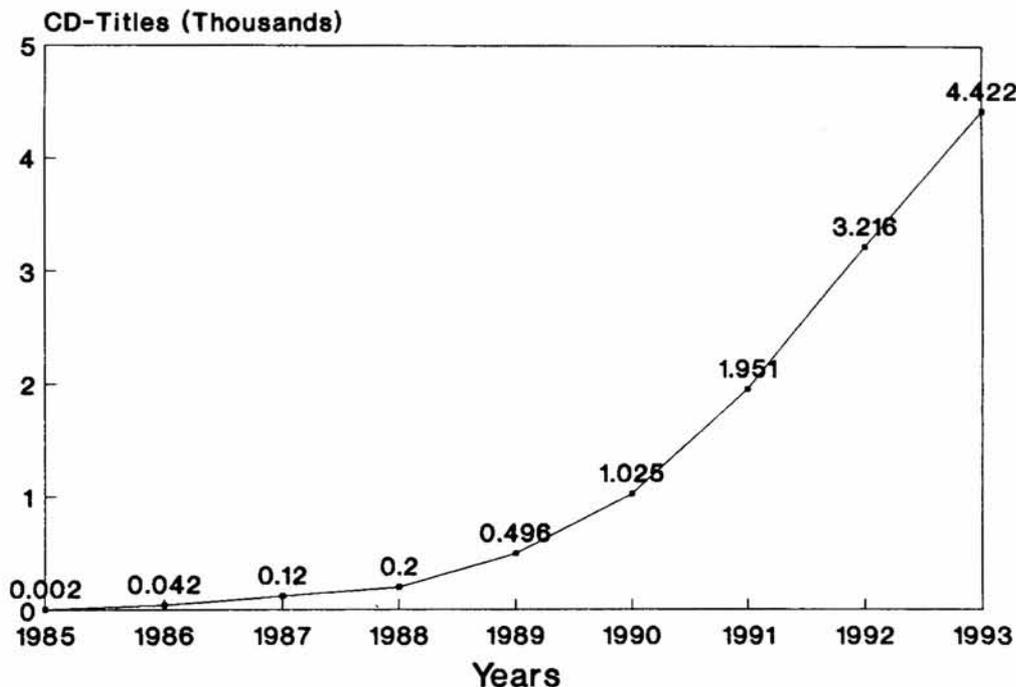
Fig. 2 : Growth of commercially available CD Titles

been found as one of the cleanest technology for reducing paper usage which has played havoc with the world's forests and environment as a whole. It is now argued that we have no choice but to reduce our consumption of paper and distribute more and more information on electronic media. According to one estimate, already 10-15% of the information generated in developed countries have started appearing only on electronic media [2]. Therefore, the libraries, in near future, will have no choice but to subscribe only to digitized documents. The Xerox Corporation, in its annual report of 1992, cited projections that the digital publishing market segment would grow at a rate of 30% per year. In the field of educational material and class-room teaching, the multi-media publishing is spreading very fast and cassettes may replace educational books sooner than we envisage. A casual view of Table 1 reveals that CD-ROM are not only enveloping the area of S&T, education but also encompassing all areas of knowledge although science and technology continue to be the most common subject area (almost a third of all titles if medicine is lumped in as well) .

INHIBITING FACTORS

Inspite of very strong driving forces in favour of electronic publishing, the electronic media has not been able to significantly replace the print media from library shelves. There are some reasons for the slow progress, though the tide is slowly rising never to reverse. Some of the inhibiting factors against electronic media may be enumerated as

i) centuries old reading habits of paper documents;
ii) convenience in reading and handling a paper document as compared to a floppy or a CD-ROM;
iii) firmly entrenched print technology and a huge investment in it;
vi) incompatible standards of electronic media products;
v) difficult handling of hardware and software for reading electronic media products;
vi) non-standard authoring processes and consequential reading difficulties;
vii) different display standards and associated problems; and

Table 1

Subject distribution of commercial CD-ROM Titles

Subject Heading	Number	Percentage
Science/ Technology	1070	24
General	931	21
Social Science	776	18
Business/Law	750	17
Arts/Humanities	593	13
Medicine	298	7

Source : *CD-ROM Professional* [3].

viii) cost and inconvenience of equipment for reading electronic media products, while no cost is involved in reading a paper document.

A careful analysis of the market forces promoting and opposing the publishing of electronic information gives a clear verdict in favour of electronic publishing as an industry and business practice, which has been reaffirmed by the real growth of this sector. Atleast the CD-ROM has already become a favorite delivery media for information and multi-media is emerging fast from other side for completing the circle.

ELECTRONIC LIBRARY

The emerging trends in the application of electronic media for wide-spread distribution of information is forcing the libraries to undergo a substantive structural modifications. The constraints of space, shelves, dusting & cleanling etc. shall be fully solved by the suggested restructuring. Prof. Tom Stonier describes what an electronic library might be like and how it might work [4]. "The library will hold materials in digitized form and its users will communicate with it over a telephone link or a co-axial or a fibre-optic cable. Its purpose is to supply its users with copies of textual, audio or video materials on request. Because supply is effected by sending a digitized signal down the communi-cation link, and the original does not leave the possession of the library, supply is not strictly a loan any more than the issue of a photo copy of a requested article".

The electronic library, therefore, envisages, first of all, that its predominant collection, if not entire, will be in the digitized form. It is not at all difficult a problem as a large number of popular titles are already being distributed on digitized media and the libraries are happily subscribing to them as these are several times cheaper than their hard copy. Therefore, the new arrivals have already started promoting the emergence of electronic libraries. However, the problem remains for the existing material in the library. A number of libraries have started digitizing their old stock on large Write Once and Read Many (WORM) discs having a capacity of several gigabytes (GB). A disc of 6 GB can store upto 1.5 lakh pages of scanned images. Some libraries are digitizing this material on CD-ROMs having a capacity of 650 MB which can store upto 12000 pages of scanned images. All the material in the libraries can not be digitized immediately, the priority may be given to the old stock material most frequently used. Therefore, the material not so frequently used will remain in the libraries in hard copy form and the existing conventional form of libraries will co-exist with electronic library for some time.

SWITCHING SYSTEMS

The recent advances in computers and telecommunications have provided facilities to the extent that the users need not travel distances to visit libraries and they can have all what they want from a library at their working desk through their computer and telephone line. The electronic library makes available its entire catalogue and all information access tools in the form of database searchable on-line from the desk-top PC. Once the required document is identified, the user may search for the document in a given CD-ROM through a CD-Net, which can be loaded in CD-Drive by an electronic mechanism of a juke-box. The juke-box may contain several hundreds of CD-ROMs and any one of them can be commanded for loading in a drive. The digitized full text data from the CD-ROM (including graphs, figures, formulas, pictures and tables) start flowing through the wire to the screen. The whole documentation can be read on the screen, can be stored on the disc/floppy or a hard copy can be printed through a printer for reading at leisure (Fig. 3).

The switching mechanism provides a facility to access the document in some other library through a Gateway service provided to its users by one's own library. The Gateway provides a single, convenient and user-friendly entry point to a selected library of bibliographic, full-text and numeric information. The system leads to a wide range of databases hosted on various computers located at different places. The users are required to know only how to find and log in to the system. Once at the Gateway, the user gets a menu of choices with explanation and help prompts. Once the user chooses his databases from the available databases, the Gateway software handles the log-in process behind the scenes.

In this way, the resources of a large number of libraries of one city, region or state become available at one's desk-top. John Martyn writes that if local libraries continue to exist - effectively as switching units—then physical locations of material are not of importance. All that matters is that the local nodes are able to locate requested material, and arrange for its transfer to the users via themselves. It would probably be reasonable to think in terms of regional stores, with a central 'last resort' back-up store [4]. In this way it could be possible to serve the whole national demand by creating a secured archive or back-up at one place in the nation. It may develop a new scenario in which a number of libraries may form their own consortium of electronic libraries to provide public services through a networked Gateway in the same way as the database vendors are joining database hosts for providing database services. In the new set up, owning a document will not matter much, the users will pay for usage only.

COLLECTION DEVELOPMENT

The strong market forces and economic considerations are exerting a heavy pressure on print industry to undergo a significant change. However, it does not mean that paper media will cease to exist in near future. The paper media will, undoubtedly, continue for quite sometime and similarly the conventional libraries will exist alongwith the elec-
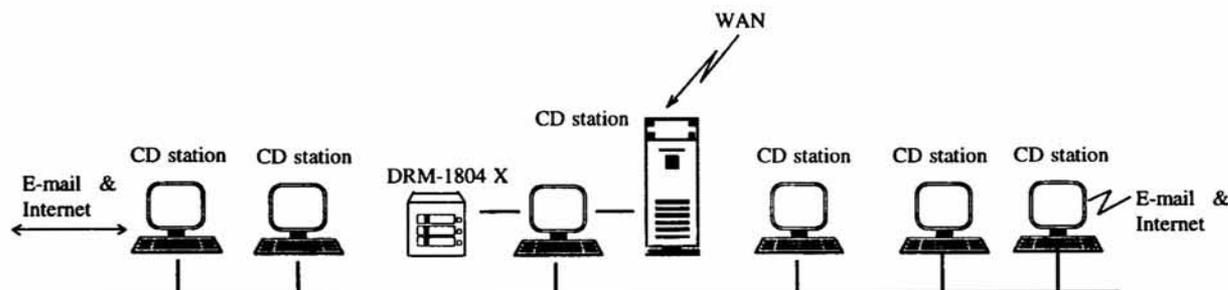

Fig. 3 : Schematic view of Electronic Library

tronic libraries for some good time even in the next century. Nevertheless, a definite and discernible trend is emerging in the world information scenario that more and more information products are appearing every year on electronic media and the specialised libraries are replacing their print media stocks and even the microfilm and microfiche media from their shelves by digitized discs. A number of specialised libraries in Western countries are converting several millions of pages per year from their old stock into digitized discs. National Technical Information Service (NTIS) of USA, for example, has digitized more than 75 million pages per year from their existing reserves of technical reports. It provides the following advantages:

i)   The reproduction of hard copy from digitized disc is almost instantaneous, neat and clean;
ii) The document can be transferred on wire to any remote place and can be stored or converted into hard copy there instantaneously;
iii) A tremendous saving in space, shelves, maintenance etc. is achieved;
iv) Ease of handling, managing, searching; and retrieval of required information available; and
v)   There is no question of non-availability on shelves or loss or multilation.

A number of large information organizations in USA and Europe are making the digitized images of periodicals which are not available in electronic form. The firms like University Micrographics Inc. (UMI) (USA), National Institute of Scientific and Technical Information (INIST) (France), British Library Document Supply Centre (BLDSC) (UK) are electronically scanning several thousands of journals for storing the materials only in electronic form, i.e. no new procurements are being made on print media. These libraries have converted themselves more or less in electronic libraries. Future uses of image technology seem unlimited. Costs are decreasing, applications are increasing and technical limitations are being challenged and overcome. As computer networking becomes more commonplace and more powerful, new image systems will make knowledge accessible and retrievable from anywhere any time.

PILOT PROJECT AT INSDOC

The R&D community of India has been experiencing a severe drought of S&T information since 1990 due to sharp drop of periodicals subscription by Indian S&T libraries. The availability of unique journal titles in the country as a whole dropped from a total of 20,000 to about 12,000 only during the course of a decade of 80s. In order to arrest the situation from turning worse, INSDOC prepared a contingency plan of procuring 8000-10,000 foreign periodicals for satisfying the information requirements of the nation. With the generous special financial assistance from the Government of India, INSDOC started procuring full text foreign periodicals on electronic media due to obvious reasons of cost effectiveness as mentioned above and giving the facilities of electronic library to its users. The number of periodicals in electronic form have been steadily increasing over the years as indicated below:

Table 2

Number of periodicals in electronic form acquired by INSDOC

Sl.no.	Subjects		Number of periodicals
1.	Bio-medical Sciences	-	632 (1991 onwards) 1051 (1994 onwards)
2.	U.S. Patents	-	1990 onwards
3.	General Periodicals	-	1646 (1987 onwards)
4.	Business Periodicals	-	870 (1987 onwards)
5.	Physical & Engineering Sciences	-	741 (1990 onwards)
6.	Standards	-	457 (1990 onwards)
7.	Conference Proceedings	-	336 (1990 onwards)

All these journals are procured on CD-ROM media. The necessary equipment and softwares have also been procured for accessing the full text data on CD-ROM and providing services to the users. The subscription entailed a high royalty on printing of each article from journals. However, INSDOC negotiated with publishers a bulk payment for unlimited number of copies to be supplied to users. Though INSDOC, at present, is not providing online access facilities to the users for its full text databases, the ultimate goal is to make all the resources of INSDOC library available for online accessing by the users from their desk-top computers. A number of tasks are yet to be completed in this regard. However, the initial steps have already been taken and INSDOC has started marching on the long road of becoming the first electronic library of the country.

INSDOC is a premier national documentation centre and has an added advantage that it is one of 41 constituent laboratories under the Council of Scientific and Industrial Research (CSIR), which together hold more than two-third of India's total foreign periodicals subscription in the field of science and technology. These laboratories are already discussing the formation of an information consortium in which the electronic library of INSDOC may play a very important role. If all these libraries succeed in digitizing their existing collection, as it is being talked about, and put these databases on a high-speed network for accessing by the users through library Gateway or through INSDOC Gateway, the electronic library movement in the country will get a major break through.

IMPACT OF ELECTRONIC LIBRARY ON SERVICES AND ROLE OF LIBRARIANS

The present libraries are selecting, acquiring and organizing the print collections and are providing instructions and assistance in finding information within the collections. Electronic libraries are being built along similar self-service lines. They are designed for use with librarians serving not as intermediaries but as consultants [6]. The librarian will continue to play the role of information provider to users in the electronic library system [Fig. 4]. However, more and more services are being built in electronic library for self-accessing modes.
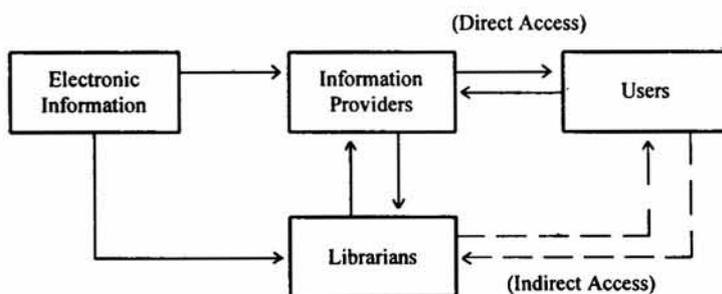

Fig. 4 : Role of librarians in the Electronic Library

A number of present library routines like acquisition, circulation and services like current awareness, reference services etc. will undergo a considerable change in the new outfit as most of these services will be automatically generated from the databases in the electronic library and the users will have direct access to them without librarian's intervention. The existing library mediated online searching of databases will also be no more relevant in the new environment of electronic library system as the users will be doing their job themselves from their desk-top PCs. The role of librarian of the future would be as heavily involved in the repackaging of the information and even in a form of electronic publishing and some librarian will become hypertext engineers. The electronic

document delivery would be introduced. Reference librarians may then advise the users the strategy to identify relevant electronic sources. The role of the reference librarian is evolving and shifting from one where online service mediation is required in the form of one-on-one tutorials or search sessions, to that of program manager, consultant, advocate.

FUTURE PROSPECTS

The new developments with respect to information technology will change the information cycle dramatically. Users will be able to access information, bibliographic databases and even primary sources wherever they are located, without country barriers, and without visiting a library. The full electronic library without staff and real books will do a poor job in the next decade and will not be able to meet all user needs in a research environment.

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