

## **Electronic publishing: Impact and implications on library and information centres**

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### **Abstract**

This paper overviews electronic publishing, electronic journal, and electronic publishing programmes of ADONIS, OCLC, IEL, ACM, and Elsevier publishers. The advantages and disadvantages of electronic publishing are briefly discussed. The paper attempts to assess the impact and the implications of electronic publishing on the libraries and information centres (L&ICs) and their services. Issues and concerns arising out of the use of electronic publications in L&ICs have been discussed. The paper also deals with digital libraries and their impact on the L&ICs.

### **Introduction**

The next chapter in the history of publishing is being written and published electronically<sup>1</sup>.

The ever increasing number of users of information and the difficulty in having informal, personal communication; the large geographic distances involved in certain routines of information acquisition; the urge to use modern developments in the related fields of electronics, computers; and telecommunications; the increasing role of information in shaping the economy of a society (the countries which produce more information have an edge over others because of the use of that information results in technological developments and the dissemination brings in financial resources in foreign exchange); and the changing notion of the information from something to know to something to have as any other commodity<sup>2</sup> have resulted in the need for improving the information services.

In recent times, developments in information technology (IT) have made it possible to overcome many of the above mentioned problems. Application of IT in libraries and information centres (L&ICs) raises the efficiency of information acquisition, processing, storage, and retrieval. The use of IT and the electronic document delivery systems on the library and information

services are discussed in detail elsewhere<sup>3,4</sup>. The present paper briefly discusses the impact and implications of electronic publishing [EP] on L&ICs.

### **Electronic publishing**

The exponential growth in the volume of published information, difficulty in retrieving information from libraries due to the literature seepage and scattering, the need to control and provide access to ever increasing volume of information, the faster rate of increase in the costs of raw materials used in publishing leading to the escalation of manufacturing costs of books and journals, the need to reduce the time required in conventional publishing, and the realization of the potential and unique features of electronic media are some of the reasons which resulted in the shift of emphasis from conventional publishing to EP.

Electronic publishing can be defined as the publication process where the manuscripts are submitted in electronic format, edited, printed, and even distributed to readers (users) by employing computers and telecommunications. In the most pedestrian interpretation, computers and related devices are used for economy and convenience in producing a conventional print-on paper publication. In the most sophisticated interpretation, the full capabilities of the electronic media — including motion, sound, and interactive features — are exploited in the creation of completely new publication forms<sup>5</sup>. In general, the fusion of electronic, computer and communication technologies with publishing can be termed as EP to mean any information source published in electronic (machine-readable) form. This would include sources distributed on magnetic tape and such media as videodisc as well as sources not really distributed at all but only accessible (like databases)<sup>6</sup>

Lancaster reported<sup>7</sup> that 25 per cent of reference books will be in electronic form by 1990, 50 per cent of the existing abstracting services will be available only in electronic form by the year 2000, and 25 per cent of the periodicals in science and technology, social sciences and humanities will not reach this conversion level until after the year 2000. It is an established fact that many journals and reference books including abstracting and indexing periodicals are available in electronic form now. If the current trend in the publication and marketing of CD-ROM products is any indication, there is no doubt that the above statement will become a reality soon.

Ever since the first electronic book was published in 1985 in Germany<sup>8</sup> there has been a steady growth in the number of electronic publication. More and more publishers of scholarly, academic and reference works from almost

all fields of human knowledge are entering into the EP field. Though many publications exist in 'dual' (both on paper and electronic) versions, some 'electronic only' publications have also emerged. The first EP products were mostly reference works, secondary publications, and machine-readable databases of indexing/abstracting services.

American Chemical Society (ACS) was the first professional association bringing out scholarly periodicals to offer its publications in electronic form when it made available full text of 18 primary journals over Bibliographic Retrieval Services (BRS) in June 1983<sup>9</sup>. Earlier ACS has offered full-text papers of its Journal of Medical Chemistry published between 1976-78. However, this service did not include tables and instructions. Harvard Business Review was made available online providing full text articles via BRS since 1982. For a long time now, most of the major abstracting and indexing periodicals are available in electronic medium. According to online databases directory, in 1993 there were 6,998 online and CD-ROM databases<sup>10</sup>. Out of these, abstracting and indexing databases issued on CD-ROMs accounted for 16 per cent of the total titles produced in 1993. It is well established that online or CD-ROM databases of the secondary periodicals are more frequently consulted by the users than the printed versions.

### *Optical discs and electronic publishing*

Optical information storage systems have become synonymous with EP. This is because of the success of the CD-ROM as the optical medium of choice for the publishing industry and also due to its adoption by major L&ICs around the world. Durability, capability to hold large volumes of data, and, of late, affordability are the important factors for the success of CD-ROMs. Many publishers including McGraw-Hill, Wiley, Elsevier-North Holland, Meckler, Grolier, Prentice-Hall, Oxford University, etc. have all ventured in this area. In due course, CD-ROMs may replace microform publications such as microfiche and microfilm primarily due to the ease of use. The usability of CD-ROMs in networking environment made this technology more attractive and acceptable to the library community. CD-ROMs, videodiscs and online bibliographic databases form a major part of the EP field.

There were only 53 CD-ROM titles in 1986 which rose to 230 titles in 1988, to over 5,000 titles in 1993 and was expected to reach about 8,500 titles by 1994. In 1993, CD-ROM titles have shown a growth of 38 per cent over the titles produced in 1992. Out of the 4,422 unique commercially available

titles in 1993, science & technology accounted for 1,070 titles (24 per cent) followed by general works (931 titles — 21 per cent) and medicine (298 titles — 7 per cent). Social sciences and humanities & arts together accounted for 2,119 titles (48 per cent), indicating that these fields too are embracing CD-ROM as a publishing medium along with science and technology. In 1993, there were over 2,500 CD-ROM producers. The industry had a base of 11.4 million CD-ROM drives which was expected to reach 15 million by 1994<sup>11</sup>. Now, many publishers (for example, Elsevier, OCLS, IEEE, etc.) are distributing primary peer-reviewed periodicals in CD-ROM format. This shows that CD-ROMs have penetrated all branches of professional and scholarly publishing. Electronic publishing started with reference books and replaced the print-on-paper reference sources to a large extent; the remaining being converted to electronic medium in the next few years.

Further CD-interactive (CD-I), digital video interactive (DVI), and CD-recordable (CD-R) are expected to provide audio and graphic capabilities in addition to the text and data. DVI has additional capability of full motion video. Other variant forms such as erasable optical discs, WORM (write once read many times), EPROM (erasable programmable ROM), holograms, have been developed as solutions to problems or as spin-offs from research by the information industry.

### **Electronic journal**

There is considerable difference of opinion on the definition of electronic journal (EJ). McMillan defined<sup>12</sup> it as any serial produced, published and distributed nationally or internationally via electronic networks such as Bitnet and the Internet. According to Langschied<sup>13</sup>, the EJs are different from online journals. The latter are the electronic counterparts of journals in print.

Electronic journal can be defined as a periodically available online or in CD-ROM format. Generally, EJ is a full-text delivery system and differs from conventional bibliographic databases available online. The full-text databases produced on CD-ROM during 1993 accounted for 47 per cent of the total CD-ROM titles.

Many factors spurred the interest in the concept of EJ. The ever increasing overhead costs such as printing, binding, packaging and mailing charges and the decreased buying power of L&ICs due to the insufficient budgets are the major factors. Other factors include the delays experienced in communicating the research results, the slowness in the flow of manuscripts, the peer evaluation process, the time required for editing, typesetting, page layout, and page proofs.

In an EJ, there is less involvement of paper. All the routines of publishing, from the initial stages of paper submission to publishing and distribution including accessing can be performed using electronic media. The author writes an article using a computer at his end. Alternatively, a paper can also be authored by more than one author separated/scattered over a large geographical area but connected through a network through e-mail or by teleconferencing. The completed paper is then sent through e-mail to colleagues and peers for comments and incorporate suggestions made, if any. Now the paper is ready to be transferred from the authors domain to the publisher's or editor's domain by way of e-mail<sup>5</sup>. The paper, then will be under editorial processing. Referees upon hearing a message or transfer of paper to their domain, evaluate and transmit back to the editor with comments. These reviewed papers are then processed further based on the final status, viz. accepted for publication or modifications needed or rejected. Once accepted for publication, the paper will be transferred into the users' domain when it is available online. This could be either issue-wise (as is the case of many EJs) or by sending periodical updates of papers automatically by matching the subject interest profiles (or upon request). When a subscriber or user accesses the EJ, the latest additions after his prior access will be tagged. Upon scanning the tagged entries, the subscriber can decide whether the paper is useful or not. Others may browse by means of search queries the titles added after their previous access.

For quite some time now, many journals are accepting papers in electronic form. The author is expected to submit the final paper in floppies or send by e-mail using the word processing software adopted by the journal. In case the author uses a different software, it is possible to export them into the target software through conversion software. The electronic submission helps in reducing the time consuming, painstaking work of inputting and proof-reading, the time involved in editorial processing, and enhances the accuracy of the typeset material. The figures/illustrations, scanned or drawn using software like Harvard Graphics, Corel Draw, Exel, Lotus 1-2-3, etc, can also be sent on separate floppies. But, these files take a large memory and sometimes it is impossible to transfer them to floppies even after using compression techniques.

Some of the ongoing EP and EJ programmes are dealt in the following sections.

### ***ADONIS***

Advanced Document Over Network Information Services (ADONIS) initially covered, in its trial version, only 224 biomedical journals published in

1987 and 1988. However, by 1994 the number of journals included in the service rose to 505 from 40 participating publishers and about 160 new titles were added to the service in 1995. The journals are primarily from the biomedical field; they also cover related disciplines such as chemistry, biochemistry, bioengineering and biotechnology. Each week, a new CD-ROM is sent to the subscribers which contains all articles (about 10,000 pages) including figures as bit-mapped graphic images.

ADONIS has benefited both the publishers who like to have a control over photocopying and the librarians looking for a change from conventional stock-room and photocopying to a space and time saving mechanism. Each time a print out is taken, the system automatically stores the information in the respective statistics file for calculating the royalties payable to ADONIS.

### ***IEEE/IEE Electronic library***

Institution of Electrical and Electronics Engineers (USA) and Institution of Electrical Engineers (UK) are offering IEEE/IEE Publications Ondisc (IPO). The service combines records from the INSPEC database with full images of the original documents. These include over 100 IEEE and IEE journals, standards of the IEEE, conference proceedings and colloquia. The index disc contains records with abstracts and index from INSPEC database corresponding to the documents available on the image disc. Approximately 25,000 records are added each year.

Starting from January 1996, IEEE/IEE Electronic Library (IEL) is being introduced. The IEL is an extension of IPO with full-text information resource in the fields of electrical engineering, electronics, computer science, information technology, applied physics and related disciplines. IEL comprise more than 200 CD-ROMs of over 2000 publications of IEEE and IEE published since 1988. These publications include over 100 scientific journals published by IEEE and IEE, about 600 IEEE standards, and 700 conference proceedings.

IEL is expected to be a premier source for the state-of-the-art information which combines a subset of INSPEC database with abstracts and index to the IEEE and IEE publications, full images of matching documents and a powerful search and retrieval software. Subscribers will receive monthly updates of 3-5 discs with over 15,000 pages of scanned images and text covering current journal titles, newly published conference proceedings and latest versions of IEEE standards. There is no limit to the number of laser prints taken from the IEL database.

### *OCLC online library computer centre*

Through its Electronic Journals Online (EJO) service, OCLC offers peer-reviewed journals online. The EP programme of OCLC started in July 1992 with the introduction of the Online Journal of Current Clinical Trials in association with the American Association for the Advancement in Science. This is the first scholarly peer-reviewed journal made available in the online environment<sup>14</sup>. This was followed by the Online Journal of Knowledge Synthesis in Nursing and Electronics Letters Online (September 1993).

American Institute of Physics is offering online version of its Applied Physics Letters (APL) via OCLC's EJO. APL Online is also available on CD-ROM form on an yearly subscription. OCLC has designed a World Wide Web (WWW) interface for the EJO service which makes subscribers to access journals using NCSA's Mosaic software. APL Online and the Online Journal of Knowledge Synthesis in Nursing are now available on the WWW and can be accessed through the Internet.

In 1995, six Current Opinions journals in the biological sciences and 24 Current Opinions journals in the clinical medicine were added to the EJO service. The Current Opinion journals are available to the readers prior to their print version and offer unlimited SDIs and links to MEDLINE database. Further, Immunology Today Online and Vaccine Online from Elsevier were also added to EJO service. From 1996, all the eleven IEE proceedings journals will be available through EJO service. Many of these online journals are covered by the abstracting/indexing databases like MEDLINE, INSPEC, SPIN, etc. and are linked to the databases to enable the user to browse the abstract to decide if the paper is suitable.

Subscribers can browse the contents of the online journals or search the entire collection by a variety of indexes, Boolean operators and proximity indicators. The Windows-based software Guidon of OCLC provides both colour and graphical images and equations along with the text<sup>15</sup>.

### *The CORE project*

The Chemistry Online Retrieval Experiment (CORE) is an electronic library of the future available at the Cornell University's Mann Library. American Chemical Society (ACS) and Chemical Abstracts Service (CAS) are pursuing this project with OCLC to provide electronic access to all the journals of ACS with associated CAS indexing dating back to 1980. In the testing phase, a sample of 31,000 papers (approximately 165,000 pages of information) from 20 chemistry journals of 1991 and 1992 and associating abstracting information from CAS were used. Eventually the project will

mount all the 20 journals from 1980 on OCLC. The CORE database, the full-text component of which is encoded in Standard General Markup Language (SGML) is translated from original typesetting files. When completed, it will have more than 250 journal-years of data. The database can be searched using XSCEPTER (X-Windows Scientific Electronic Publishing and Retrieval) graphic user interface with a variety of search options such as find, browse, table of contents, and display options<sup>16</sup>.

### ***The ACM electronic publication plan***

The Association of Computing Machinery (ACM) is exploring ACM Electronic Publishing programme with a vision to meet the future challenges of 'digital libraries', and plans to move aggressively into EP and preserve openness of ACM publications in the new media<sup>17</sup>. OCLC and its subsidiary Information Dimensions, Inc. have jointly developed OCLC/IDI System of Total Electronic Publishing Services (STEPS) which is implemented at the ACM. The STEPS, an end-to-end EP system for scientific journals, is designed to encompass data capture, conversion of the paper, SGML editing, composition of the finished document, electronic distribution and work flow tracking, i.e., from author's draft to the reader's computer. STEPS automatically translates the papers written by the authors in any of the four word processing software — LaTeX, Word Perfect, MS Word, and Framemaker — under DOS/Windows, Macintosh, OS/2, and Unix environments into SGML<sup>18</sup>.

### ***Elsevier's TULIP project***

Elsevier Science Publishers in association with OCLC and a few American universities, under its TULIP (The University License Project) programme, is exploring electronic access to journals without SGML tags. The information will be supplied by Elsevier in non-SGML coded TIF files (created as page images scanned at 300 dpi) and ASCII files (created using OCR software). Under this project, Elsevier would supply bitmapped images of about 45 journals in materials science to eight implementing American universities for mounting on experimental basis during 1993-1995 for usage data collection. The project has three primary objectives: to gain insights into the technical issues involved in providing access to bit-mapped images of journals, new economic models for the transition of commercial journal publishing into the networked environment, and how readers used journals in the networked environment. The project has been an overwhelming success with technology issues. The OCLC provides its database retrieval engine Newton and the user interface Guidon software for the TULIP programme<sup>19</sup>.



## **Benefits and drawbacks**

### *Advantages*

In electronic publishing, the data can be maintained up to date so that the buyer will be able to purchase the latest version of publications (for example, encyclopedias, directories). This enables 'on demand publishing', and allows retrospective searching and SDI. The individual subscribers can be provided with only those documents which match their profiles, and can be charged accordingly. An important factor is that the L&ICs need not 'buy publication' to access the information in it; they can have online access to the EP and download or print the required material. The EPs provide aids for connectivity, audiovisualisation, customizability, creation and revision of documents, interactivity, and rapid information retrieval.

The most important advantage of EJs over the conventional journal is the saving in the turn-around time, i.e., the time lag in submission, refereeing, revision, editing, composing, printing, binding, and forwarding eliminated by using computer and communication networks. This enhances timely publication and is suitable to the letters-type journals where rapid communication is of utmost importance. The electronic version also offers Boolean search of the full text to browse and read only the selected items. Further, when computer and communication facilities are available, the reader need not go to the L&IC and need not have to sift through unwanted material as in conventional journals to retrieve the relevant papers. Electronic publications may help in overcoming the restrictions on the length of the paper imposed by many scholarly journals.

### *Disadvantages*

Some of the problems of EP include high initial costs to the publishers as well as L&ICs have to invest before benefits are expected, the non-compatibility of hardware (and hence the market potential) due to the absence of common standards, and the usage of different retrieval software by different publishers. The acceptance of EJs depends upon the user-friendly retrieval software. As a prerequisite, EPs necessitate the availability of a computer and communication network to the subscriber. The gap between developed and developing countries (those who can access and those who cannot) makes the EPs an elitist technology.

Electronic journal may take some time to percolate down to the reader level mainly due to the problem of displaying page images conveniently on a computer screen. For an entire page to be accommodated, the size of the image has to be reduced and the low resolution makes it difficult to read.

Ease of use, i.e. reading at a convenient time and place, is not possible with EPs. As there are no restrictions on the length of the papers and of course no page charges, the quality of papers may be poor if lengthy papers are accepted. Other disadvantages include the psychological feeling that researchers generally read more outside their work place, thus requiring portable reading material, though this problem can be solved by taking a printout of the required literature.

One major drawback of the Ejs at present is their delayed release. Though there are many publications which are available only in electronic medium, in many instances, when the publication is issued in both printed and electronic forms, the electronic version is released after a gap of three to four weeks. Other problems include the necessity of training for the subscribers and readers, and multiple copying license/charges (for example, ADONIS). Due to these factors, unlike their printed counterparts, EJs are not open to all but somewhat restricted.

Notwithstanding these drawbacks, EJs will become all pervasive as their printed counterparts, at least in some subject fields. The day may not be too far when a researcher is able to read an EJ at a convenient place and time using laptops (to read in journeys, leisure, etc) and computers at home.

### *Impact on L&ICs and avenues for exploitation*

The impact of EP in general and EJs in particular are four-fold. These are more useful due to inherent capabilities for manipulation and searching, providing information access is cheaper to acquiring information resources, savings in storage, maintenance, etc. and sometimes electronic form is the only alternative available. These offer a variety of capabilities to enhance the quality of services offered by L&ICs. A few avenues where the potential of EPs can be exploited are discussed in the following sections.

### *Accessing information*

Electronic publishing has changed accessing of information by end-users to some extent. Unlike printed publications which offer unlimited and personal access, EPs provide access mostly through intermediaries, though direct access by individuals is possible to a limited extent. This is mainly because of technical reasons which include availability of suitable technology training end-users in handling a variety of retrieval software, search strategy formulation, and security and cost considerations in the case of online resources.

### ***Quality of services***

The major impact of electronic information on an L&IC would be directly on the quality of information services. In future the L&ICs would continue to provide access to information after locating in databases rather than having comprehensive acquisitions. Personalised/mission or project-oriented databases will be developed by downloading information from electronic publications. The downloaded information would be edited, revised or repackaged as per the requirements.

Electronic publishing facilitates faster and better quality of services including value-added products, enhancement in the number of clientele served with little or no extra inputs, marketability of information services, and networking and remote log-in for geographically, distributed users. These factors certainly will enhance the reputation of the L&IC. The impact of EP on research scholars and other users, publishers, and L&ICs have been dealt in detail by Aluri<sup>20</sup> including the role of L&ICs in the changing environment, the distinction between local and external collection, the role of inter-library loan and reference services in the new environment.

### ***Electronic clipping services***

On the lines of selective dissemination of information, many database services have developed new ways to provide professional news, both in real-time and with periodic updates. These are called 'Electronic Clipping Services'. Users can set up profiles on most major databases to monitor customised news including current events, company and industry news, evolving issues and other topics of interest<sup>21</sup>. These include P.A.S.S.PORT of Data Times, Alert Service of Dialog, CLIP of Dow Jones/Retrieval, News Flash of NewsNet, Eclipse of Nexis, etc. Some are same day services covering about 100 newspapers, a few search all databases held by the vendor. These will have an effect on the information services offered by the L&ICs.

### ***Electronic reference services***

Since 1993, the Atlanta-Fulton Public Library is offering an electronic reference service called PASSPORT which provides access to the library's online catalogue, commercial databases and electronic reference sources such as *Master File* (a collection of 350 full-text magazines), *Facts On File*, *Company Profile*, and *Academic American Encyclopedia*. From 1995, dial-up access was provided to all the patrons who can access all the library's databases from their homes, offices and work places. The library also provides connectivity to Internet<sup>22</sup>. Many L&ICs are already involved in such activities (both online and off-line). This phenomenon is going to increase in future.

## Issues and concerns

Though many talk about global information revolution, it is mostly experienced in developed and wealthy countries where interactive CD-ROM products are released more and more and high-bandwidth computer networks are available. This is evident from the following figures. Out of the 6,998 online and CD-ROM databases listed for 1993, only 41 (i.e., a mere 0.6 per cent) are from the developing countries; of the 1,433 CD-ROM titles published through out the world during 1993, only 31 (i.e., about 2 per cent) came from the Third World. The country-wise number of Internet hosts/nodes in the developing countries is too few to feel happy. About 97 per cent of the nodes of Internet in the year 1992 were located in developed countries (about 62 per cent in USA alone)<sup>23</sup>.

The problems and concerns of publishers, L&ICs as well as subscribers include issue of single articles versus full issues of EJ, copyright, user-friendliness, pricing, networks, incompatible hardware and software, formatting, graphics, scholarly recognition, and obsolescence. The problems of an EJ like credibility, accessibility, permanence and the associated technical issues concerning the dissemination over networks (Internet), scholarship, etc. were dealt by Collins and Berge<sup>25</sup>. A few are dealt here.

### *Accessibility*

The EJs will be easier to access only when the necessary telecommunication link and computer system are available to the user. Incompatible hardware and software, the gap between developed and less developed countries, geopolitical compulsions are also some of the related issues which influence the accessibility of an EJ. Further, unless the users/subscribers are trained in the mechanics of search and retrieval techniques, the EJ though 'available' will be inaccessible. This calls for establishing training facilities for the subscribers/users to access EJs through networks.

In an evaluative study of the electronic issue of the New Zealand Journal of Marine and Fresh Water Research, doubts about universal access to information, preference to hard copy over screen displays, and disappointment with the quality of graphics were expressed. The respondents described that electronic publication must supplement and not replace the printed journals<sup>26</sup>.

### ***Acceptability***

The readers as well as authors prefer conventional prestigious journals to consult or publish. This may be linked to their promotions, appointments etc. More over, the technology has not percolated to the required level to make the electronic publications acceptable on par with their printed counterparts. However, in future, the research community is expected to heavily use networks, e-mail, bulletin boards, etc. for scientific communication. This will necessitate speedy publication and distribution of scholarly publications, thus enhancing the acceptability as well as the number of EJs.

### ***Accountability***

The question of cataloguing electronic (online) journal issues, volumes and back volumes needs to be answered. Some issues like the agency to oversee stability and authenticity of material, maintain the collection including archival, long-term storage and access, and granting equal access to the information are to be addressed in depth<sup>27</sup>.

### ***Awareness and coverage in secondary periodicals***

An important point which influences the accessibility of an EJ is the awareness. The reader should know about the existence of the EJ, its mode of access, and charges/tariff, if any. This calls for reference tools such as directories and also bulletins/newsletters to announce such information.

Another point which greatly enhances the access of EJ is their coverage in abstracting and indexing periodicals and databases. As of now, very few are covered by these services. Perhaps this may be one of the reasons which made many publishers to opt for both print and electronic versions. Further, it is difficult to cite material from EJs due to their non-coverage in secondary publications. The reluctance of authors in submitting their papers stems from the lack of audience and uncitedness due to the non-coverage in secondary services. In due course as the EJs gain wide acceptance from researchers and professionals, we may see increased coverage in the secondary periodicals.

### ***Preservation and archiving***

Selection, acquisition, organisation, provision and preservation of back volumes are the functions of L&ICs and not the computer centres or networks which are at present providing access to the electronic publications. When the 'copy' is available through networks, who will ensure it archiving and in what form? CD-ROMs, video discs, magnetic tapes, and online databases are some of the forms which can be used for archiving the EJs. Agencies like the

National Academy of Public Administration of USA are taking steps to develop standards for preservation of EJs. This may influence the nature of availability and preservation of EJs<sup>28</sup>.

### ***Readability***

Even computers with the best resolution cannot match the print equivalent for reading. This in addition to the lack of pagination (for example, IPCT), ease of usage, and the transportability of publication for a leisurely reading at a convenient place and time still make the printed journal preferable over the EJ.

### ***Ethical and sociological factors***

One important concern of electronic information is its vulnerability to manipulations, additions, deletions, etc. This may raise problems such as integrity, authenticity and stability of published data. This may be one of the important reasons for the author's unwillingness to publish in the online journals. Further, these cannot be closely monitored or their use cannot be restricted as in the case of printed journals. These may result in plagiarism, authorship conflicts and impersonation. Some of these problems have been addressed by Lynch<sup>29</sup> who suggested dedicated server, document digest algorithms, and cryptographic signatures to overcome some of these problems.

The issue of sociological and psychological impact on the profession and the traditional role of the L&ICs in the event of the researchers accessing information resources from all over the world through networks without actually entering into a L&IC is difficult to understand and address at present. Perryman provided some guidelines to avoid the latter situation<sup>30</sup>.

### ***Copyright and pricing***

Legal issues relate to the copyright and ownership and also with respect to rules and regulations governing multiple usage. Publishers may not get returns when copyright violations (illegal photocopying) are taking place resulting in revenue losses and to avoid this situation, they are bound to impose stringent copyright rules and mechanisms to collect photocopying charges. To overcome this problem, many projects are underway. The ISI Electronic Library Project is developing<sup>31</sup> a security and rights management system which will take care at the client, and local and central server levels. The system provides secure viewing through password, secure printing through session encryption and water-marks, guaranteed document authenticity by

means of a 'digitally signed finger print', and use privacy. A hidden watermark in the image file of each page of an article will discourage unauthorised copying.

These attempts may be seen as non-user-friendly by the end-users. Copyright is a social construct that has been and should be tailored to achieve the purposes meant for it. It is not a predestined, static law of humankind; some leakage (unauthorised copying) has always been there. Tolerating some leakage, as long as it does not hemorrhage, may be of interest to publishers in the long run<sup>32</sup>.

Determining how to charge an L&IC for the use of online reference works is a challenge for publishers. When cooperative acquisition and inter-library loan are being followed by a group of L&ICs, this issue becomes even more problematic. A few such scenarios are dealt in detail by Gold<sup>33</sup>. However, the Usage Statistics Collection and Management System being developed<sup>34</sup> by ELINOR Electronic Library Project at Milton Keynes (UK), to analyse the usage of electronic or digital libraries may be able to help solve such problems. This project aims to analyse two types of statistics. The first type is for the publisher concerning the number of pages browsed, time spent and the number of pages viewed and printed by the users. This will also enable the system to calculate charges, if any, towards photocopying. The second type of statistics relate to maintain users' accounts, monitor and find out the heavily used documents, and to know the user reading patterns.

### ***Standardisation***

At present the EJs are available in various forms, formats and through different access points. This is a problem for the reader for accessing. Some of the EJs do not include page numbers as the size of the page in different computers (VDUs) is different. This raises citation problem when the same material to be cited can appear in different pages. The hardware and software are also to be standardised to enable the end-user to retrieve information irrespective of the make of the machine. A common command information retrieval language which can work with any sort of computer and retrieval software may be useful in such situations.

### ***Digital library***

Libraries and information centres have been described to be in transition; their change to 'electronic libraries' has been felt in the nature of functions and services offered by them and also in the behaviour of users in terms of enhanced information access and increased demands. However, the

transformation of 'electronic libraries' to 'digital libraries' is perceived as a matter of term preference and not due to any change related to duties, functions or objectives of L&ICs, much the same way as bibliometrics (a preferred term to librmetry) given way to informetrics, a term widely in use now. A digital library, though popularly taken as an electronic version of the L&IC (digital storage of information), may mean differently to different users.

Libraries and information centres may have to face many challenges while transforming to digital libraries; addition of more and more electronic, and digitized information, providing access to the digitised information, sorting out issues like access to information versus ownership and reappropriation of budgets towards maintaining computer systems, databases etc. versus maintaining stock.

Yerkey defined<sup>35</sup> digital libraries as electronic libraries in which large number of geographically distributed users can access the contents of large and diverse repositories of electronic objects. Electronic objects include networked text, images, maps, sounds, videos, catalogues of merchandise, and scientific, business and government datasets. They also include hypertext, hypermedia, and multimedia compositions. Many variant definitions can be found in the literature.

The three main characteristics of digital libraries are the storage of information in digital form, usage of communication networks to access and obtain information, and 'copying' by either downloading or on-line/off-line printing from a master file. Preservation, search and access, content creation, and delivery are its essential components. Digital libraries use and provide information in digital format<sup>36</sup>.

Recognising the way digital libraries will forever change the existing cultural, social, organisational, economic, intellectual and technical infrastructures for information delivery, the School of Information and Library Studies at the State University of New York at Buffalo is offering a course in digital libraries from 1995<sup>35</sup>. The Department of Library and Information Studies at Loughborough University of Technology, with the support of British Library, is planning to establish and evaluate a training electronic journal. The aim of the journal is to provide a test bed to train L&IS students in editing, running and using EJs. There will be five sites, three in UK, and one each in Australia and Sweden which will mount information for use by their students. All five sites will be inter linked with each other for accessing of information in the EJ<sup>37</sup>.



Many objects and initiatives are underway to solve problems, discuss the issues and concerns involving digital libraries<sup>38</sup>. ARPA, NASA and NSF of the USA have jointly announced several digital library projects over four years to advance the means to collect, store and organise in digital forms and to make it available for searching, retrieval, and processing via communication networks (see Yerkey<sup>35</sup> for more information).

The topmost priority of an L&IC, digital or otherwise, is to serve the information needs of its clientele. While traditional libraries, a meeting place of researchers, support formal, interdependent, collaborative learning and research, digital libraries however, may facilitate individual, independent and informal learning. Digital libraries are expected to play a major role in formal learning as well by providing the teachers and learners with more information in a variety of media. The potential role of digital libraries in teaching has been discussed elsewhere<sup>39</sup>.

## Conclusion

The number of journals available 'on line only' are increasing by day. For example, some of the journals offered by OCLC like Current Clinical Trials and the Online Journal of Knowledge Synthesis in Nursing have no print equivalent. These are published fast, the peer-reviewed papers are edited and marked up in SGML and sent to OCLC which are made available online within 24 hours. Even software companies are entering into this area. Microsoft is planning an online EJ (no print version) which will be available on Internet and Microsoft Network<sup>40</sup>.

Business India magazine is internationally available now on CD-ROM. Launched in December 1995, the new version is a quarterly periodical and cumulative in nature, i.e., each issue of the volume will contain the previous issues. The publication is already accessible over Internet<sup>41</sup>. McGraw-Hill is offering electronic version of its Business Week on America Online which has resulted in attracting new readers. It receives over half a million clicks on its pages every week and each 'click' generates revenue. This 'feedback' enabled editors to analyse and feel the pulse of the readers' interest to revise content. If desired, readers of the online version can also have a chat session through e-mail with the authors of the lead articles. It was reported that the electronic products account for 35 per cent of the McGraw-Hill's total revenues<sup>42</sup>. Magazines like Time, Newsweek, PC Magazines and PC/Computing are already issuing CD-based versions. Electronic interactive magazines distributed online or on CD-ROM have tremendous potential as complementaries and companions to their printed counterparts.

The Internet is changing the notion of library as a place into a library without walls. Internet, the global network of networks, has over 1.77 million host computers with a new host added every ten minutes<sup>43</sup>. And in North America alone, the Internet has over 30 million users. About 200 daily newspapers, 600 magazines, over 1000 newsletters and other products are available, online via communication networks and Internet<sup>40</sup>.

However, the rate of progress depends upon several factors such as user acceptance, economics, commitment to established products and services and also the pace of technological advances. The usage of electronic information networks such as Internet, Gopher, WWW, Easynet, etc. are on the increase. This has a positive impact on the way the information is generated, communicated, processed, acquired, retrieved and disseminated. The availability of bulletin board services, e-mail, file transfer capabilities, etc. have made it possible to disseminate the information faster across continents.

The day is not too far when one may be reading a favourite magazines interactively.

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