Digital libraries: development and challenges

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Abstract

Digital libraries are here to stay, and the conversion of traditional to digital is inevitable. Appropriate care should be taken to develop systems and managerial skills as well. Globalisation of the digital concept will not be possible until we overcome the technological gap between developed and developing countries. Measures are needed to overcome the menace of computer viruses and also unauthorised use. Sufficient thought has not been given to attaining self-sustained growth. It is therefore essential to explore new avenues for funding, particularly since initial investment in digital libraries is high, as is maintenance.

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Introduction

"A man will turn over half a library to make one book", said Samuel Johnson (Cohen and Cohen, 1960, p. 209). In other words, he expressed the difficulties of procuring materials for research and writing. However, he refrained from mentioning the enormous amount of money and time required for being in London to make use of the library facilities. He would certainly have envied his modern counterparts, who can make use of library facilities anywhere, thanks to the digital library concept and the application of the latest tools of information technology.

Definition

What do we mean by the term "library" and how does it differ from a digital library? Traditionally a "library is a place in which books, manuscripts, musical scores, or other literary and artistic materials are kept for use but not for sale". In effect, it is an institution oriented towards collections and custody, where people may make use of the facilities. Whereas a digital library is a computer-based system for acquiring, storing, organising, searching and distributing digital materials for end user access. It is not network-based but designed to be capable of being attached to a network. A digital library is not just a collection of material in electronic form, it includes a browser interface and perhaps a virtual space and society. It requires less space and the data can be made available through communication networks to anyone anywhere, while facilitating searches with speed. The digital library is not a single entity and as such it is linked to the resources of many such collections.

"Welcome to a special issue on information and how to digitise it, manipulate it, find it, link it, store it, protect it and oh yes share it with the rest of the world. We can call this work digital libraries", said Diane Crawford (Kaul, 1998, p. 173). The growth of digital libraries involves: digitisation of existing library materials; connectivity to the users in the world online and offline; integration with networking; and availability on the World Wide Web. In the West, the major initiative in digital libraries is to make publications available on the Web in full text. Many publishers have begun dealing with libraries

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through Electronic Data Interchange (EDI). Traditional libraries which were known as repositories of knowledge have now become accessible in database form. The Internet and Web are making knowledge universal and linked internationally.

Digital libraries will be widespread and accessed as full text from any location or workstation. Digitised data are copied, but in all sorts of permutations and combinations, which print media cannot afford so easily, and also the desired results can be sent to any part of the world at high speed and at low cost.

Objectives

This article attempts to identify some of the problem areas and suggest measures to overcome them so that digital libraries can function effectively. The objectives are:

- to identify workable modalities to overcome the problems arising out of converting traditional to digital;
- to identify the role of digital libraries in making knowledge universally available;
- to explore possibilities of private participation in terms of money and staff;
- to explore avenues to promote income generating programmes;
- to prevent unauthorised use of data in violation of intellectual property rights;
- to explore avenues for attaining self-sustained growth.

Conversion of traditional to digital libraries

Historically, if we look into the development of libraries and reading rooms in particular, it is apparent that they came into existence out of necessity rather than by compulsion. There are no statistics showing how many libraries there are worldwide, but details of libraries in the developed countries and a few from developing countries are available. It is a similar case for the number of people using libraries and the number of books and periodicals each library has accumulated over a period of time, and the total number of librarians working and their staff.

Constitutionally libraries in India are included in the State List. The central government has jurisdiction only over libraries it has established and institutions declared to be of national importance. For the literate population of about 500 million, which is more than one and a half times the population of the USA, there are more than 71,069 libraries: 8,267 academic, 54,845 public, 1,200 science and technology, 450 social science, 800 government departmental, 500 art/cultural/ humanities, seven national and 5,000 industrial and private institutional libraries (Kaul, 1998, pp. 39, 119). But they cannot be called libraries in the usual sense, for more than 90 per cent of them are simply reading rooms. According to the *Statistical Abstract of the USA* (1999), the total number of libraries in the USA up until 1997 was 37,591.

We cannot ignore the role of librarians and their supporting staff. Are they being provided with adequate training and the necessary guidelines to execute a smooth transition from traditional to digital? It is vital to look at the colleges and institutes training future librarians. Do they have common syllabi and training methods to meet the additional requirements of digital libraries? The answers to these questions are emphatically "no" and "not yet". All the above difficulties need not discourage proponents of digital libraries, but they must be addressed quickly and cooperatively.

Digital libraries depend on Internet and intranet connections, yet we have not found a foolproof system to prevent virus damage. Therefore it is advisable to retain the traditional library setup despite developing a digital version. That is, for the sake of uninterrupted functioning, it will be necessary to have both systems, creating further strain on the system itself.

The Internet and intranet being the core of the whole system, differences in technology between developed and developing countries will persist. Upgrading information technology is vital and should be accorded high priority by each country. However, steps should be taken to narrow down the existing gap and to incorporate the latest developments without any time lag. If this ongoing process is not attended to, the whole system will fall into disarray.

With the introduction of digital libraries, the library profession is changing. Librarians and their staff must prepare themselves for the transformation from an era of scientific management to systems and structural management. It is a combination of

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functionally related computer systems and sub-systems where conventional practices will give way to innovative organisational managerial formats.

While planning for the change from traditional to computer based systems, it is necessary to take it in stages. Some of the points to be considered are:

- anticipated traffic to flow over the network;
- origin and destination of that traffic;
- types of applications that will be made available on the network; and
- set procedures if part of or the whole network fails.

Apart from organising materials in a format suitable for computers, it is necessary to develop safe methods to provide uninterrupted service. Sufficient fund allocations should be made for maintenance purposes, which is not only a high cost but also recurring.

In the initial stages, librarians have to overcome psychological aversion from both users and support staff. It is easier to overcome the difficulties of the former than the latter. The staff fear not only displacement but removal from services. The answer to this is in giving due emphasis to in-house training. Appropriate instructions and roles assigned to each will help not only in building confidence but also in emphasising inclusion in the whole development process.

Digital library maintenance is more difficult

Ackerman and Fielding (1995) believe that digital libraries containing informal and dynamic material including software architecture will have substantially greater maintenance problems that may even threaten their long-term viability. The traditional, or paper-based, library has established methods of maintaining access. However, we do not yet have maintenance methods for the digital library that include dynamic and informal materials. Traditional collections can be maintained with extension of traditional methods whereas maintaining the dynamic and informal documents will be possible only with new technical solutions.

In the traditional paper-based library, there is considerable control over the collection as there have developed many practices such as circulation, technical services and even shelving to maintain access to the collection over time. This type of library could never cope with the limitations of traditional practices in dealing with ephemera and would require too many resources. Digital libraries may need to find new maintenance mechanisms. Traditional libraries are narrowly-construed, where the collection has known boundaries and possibility of control over the collection is easy. In the broadly-construed digital library, users are able to access diverse material, that leads to serious control and long-term maintenance issues. The digital library is more than a set of technologies, it is also a social institution with long-term needs and maintenance requirements.

Universal access to knowledge

The core issue of IT development is the objective of providing universal access, in which libraries play a crucial role. India has launched an ambitious plan to achieve this within ten years. It is proposed to instal Internet access in every school, university and public hospital (Ninth Five Year Plan Report, 1997-2002, pp. 100-44). IT is being made a compulsory subject in all courses at undergraduate level and networking facilities are being extended to all higher centres of education. There are at present 877,309 schools comprising primary, middle and higher secondary schools with an aggregate enrolment of about eight million students. There are 226 universities, 6,569 general colleges and 1,354 professional colleges. In addition, there are 835 teacher-training colleges and about 140,000 hospitals. Bringing Internet access to all is a daunting task. This is not only a problem in India but in other developing countries as well.

For users of a digital library, it is essential to have a personal computer with an Internet connection. In 1995, there were 1.2 personal computers per 1,000 population in India. However, it is estimated to be around two now and expected to reach 20 in the next few years. Many of these computers may be connected to the Internet. This is far below many developed and developing countries. In 1995, Switzerland had 348 PCs per 1,000 people followed by the USA (328), Australia

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(276), Denmark (269), New Zealand (223), The Netherlands (201) and so on. In Asia, the situation is not so encouraging irrespective of the recent high profile economic growth. Japan had the highest number with 153 PCs per 1,000 people followed by Republic of Korea (108.3), Malaysia (37.3) and Thailand (13.6).

The situation with regard to Internet users is also not so encouraging. Finland were at the top with 139 per 1,000 people followed by Iceland (112), Norway (64), Canada (41.2), The Netherlands (38.8), the USA (38), Australia (55.4), Switzerland (35.5) and the UK (25.6). Among Asian countries Japan recorded 7.2 Internet users per 1000 people, followed by Malaysia with two, and the rest were far less than one (Human Development Report, 1998). Such a situation does not bode well for the globalisation of digital libraries. According to the Action Plan on IT approved by the Government of India, India is likely to have about five million Internet users by the end of the year 2008.

Language barrier

"The limits of my language mean the limits of my world" wrote Ludwig Wittgenstein (*Hutchinson Encyclopedia*, 1997, p. 611). If this is true, then all the written material in other languages is unavailable to us. There are about 6,000 languages spoken in the world, and of these nearly 90 per cent are dying out. It is estimated that just over half of the world's population speak one of just five languages: Chinese, English, Hindi, Russian and Spanish.

In India alone there are about 18 official languages and more than 1,000 dialects spread over 608,752 villages. Is it possible to provide material through digital libraries in all these languages? Unless this is achieved digital libraries and universal knowledge will be restricted to the élite familiar with one of the major languages of the world. The challenge is to evolve a strategy so as to provide information in the language required by the reader. International institutions should work out a programme in close cooperation with governments in each country. Language is the embodiment of a culture and preservation of identity is important.

Private participation

In the past libraries came into being at the behest of kings and nobles, and enjoyed aristocratic patronage. With the change to a democratic political system, the responsibility fell on the government. The private sector, and the corporate sector especially, were not involved. Any contact was related to their own concerns, not the development of libraries.

Now the private sector, particularly in advanced countries manufacturing Internet related equipment, is in a position to extend both material and financial support. Being the major producers of computer technology they are able to set up such industries in developing countries.

Developing countries could offer incentives such as tax breaks, investment subsidies and so on. This would provide sufficient inducement to the corporate sector in the developed world to get involved in producing goods on a mass scale and participate in development. This alone would help in reducing the cost of goods needed for constructing a digital library.

In this regard India has the added advantage of an adequate number of computer technicians and software specialists. However, it has to attend to the other aspects too, for instance, ensuring an uninterrupted power supply and improvement in telecommunications systems. The Ninth Plan has given priority to these two vital areas.

Within about a year after the introduction of the "Action Plan for knowledge for all" by the government of India, most of the public telephone centres in the metropolitan cities in India have Internet facilities. However, the cost factor remains an obstacle to its spread and effective utilisation. It is yet to reach rural areas. This is due to the expense, as well as a lack of appropriate methods to translate the material into local languages. In this regard the private sector has come out with some software developments in two regional languages, Kannada and Telugu.

At present India has about 210 television sets per 1,000 population and cable services are available. The possiblity of using televisions to access the Internet is being researched. Success in this field would make every household a participant in the digital library system. Also, it could facilitate the involvement of the private sector in promoting and operating digital library

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services. The Tamil Nadu government proposes to set up 13,000 Community Internet Centres all over the state to provide easy access to computers and the Internet (*Hindustan Times Daily*, 14 May, 1999). This scheme will be implemented by setting up a joint venture company with World Tel. of the UK. About 1,500 centres will be set up during the coming year, while another 12,000 are planned in the next three years. When the centres become operational, they are expected to create direct and indirect employment opportunties for about 150,000 persons as well as serving as resource centres for information.

Self-sustained growth

Libraries in developing countries in particular rely primarily on governmental funding. The resource crisis has affected every field of activity. The problem is further confounded by the increasing cost of books and periodicals in developed countries and the falling value of the currencies of developing countries in the international market. Further periodic increases in freight charges add to the strain on the already low budget allocations. Also, many public and departmental libraries are understaffed. It is clear that relying on the government is not conducive to self-sustained growth.

Under these circumstances we have to explore ways to earn income so as to reduce dependence. This becomes all the more important in the context of globalisation. It is therefore essential that adequate thought is given to finding resources for digital libraries and their upkeep.

Apart from introducing user charges, it is useful to consider other avenues as well. In this regard insufficient consideration has been given to areas such as issuing bonds and shares while establishing a major unit centre. Also, the participation of the business community and international financial institutions needs to be explored. The business community could be offered tax incentives provided a portion of their profit is used for developing digital libraries. Local and international financial institutions could also be induced to offer interest free loans for the promotion of digital libraries.

Prevention of unauthorized utilisation

Growth itself is not enough. Like a general, the librarian has to safeguard the very functioning of the system. Common laws and procedures must be adopted by every government so as to eliminate misuse and theft of information. Filtering systems should be used so that genuine users are not inconvenienced.

An information product is intellectual property (Thurow, 1997). The protection of intellectual property rights and privacy are the two areas the World Intellectual Property Organisation is seriously concerned with. Its December 1996 Diplomatic Conference produced two treaties: the WIPO Copyright Treaty and WIPO Treaty on Performances and Phonograms. The first Copyright Treaty supplements the century-old Berne Convention by clarifying that the digital transmission and distribution of literary or artistic works – works historically protected by the convention – will now receive copyright protection. The second Treaty on Performances and Phonograms includes harmonisation provisions because of the first global effort to protect the exploitation of sound recordings. Talking about protection of intellectual property laws, the US Commissioner of Patents and Trademarks Bruce Lehman commented that we are only now beginning to see the Internet and international electronic commerce development. There is a huge potential for growth and new technologies have not been used, precisely because of inadequate intellectual property protection globally. One of the main tensions in international trade has been over intellectual property because one of the problems is massive piracy.

Virtually everyone in the world is involved in the information industry in some way, either as a producer or consumer of information. So, we must have a global legal system supporting the digital electronic market place which allows for the proper functioning of free market forces. This can only happen if intellectual property rights are protected. But the new global digital network environment creates special problems and strains on the traditional system of copyright. One of the strains is that national boundaries have become almost meaningless in the digital world. It is difficult to recognise a work of authorship distributed on the Internet. And it

is almost impossible for an individual nation to assert any kind of national control over the product or to protect the intellectual property rights that are represented by it.

With the advent of the so-called third industrial revolution, skills and knowledge have become the only source of sustainable long-term competitive advantage. In this global economy, a global system of intellectual property rights is needed. Since the library and information industry are the only channels for disseminating information, they have a joint responsibility in fighting against intellectual property infringement as it affects everyone including users.

Narrowing the technological gap

Adapting quickly to new technology is vital for success. The electronic revolution coupled with improvements in communication makes it imperative to look beyond today and prepare for tomorrow. Changing print material into digital form will be a difficult task. In this new millennium we are going to close the gaps between print and digitised documents, document libraries and knowledge based libraries, IT specialists and information specialists, and information seekers and information providers.

Technological adaptation is one thing and growth is another. That has to come from within. In order to promote continuous upgrading of digital libraries, each country should set up a coordinating committee to interact with various agencies, especially computer and telecommunication people. India, in particular, where technologies of all ages are operating, needs a complete transformation in information policy to pave the way to the digital library era.

The new global realities of information technology, political order and cultures should also be taken into account. No doubt, technology is bringing the world together, but many cultural factors fundamentally divide people. The existing tension between the technologically strong and the weak is already creating political pressures in the world that are not conducive to a peaceful world order in the twenty-first century (Varis, 1998).

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