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Digital Libraries: Concepts and Issues

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ABSTRACT

The libraries are adopting the changes from time to time. From the days of papyrus to the digital libraries, libraries are undergoing tremendous developments. During the last part of 20th century the emergence of new technologies such as computer, CD-ROM, DVD-ROM, e-mail, e-commerce, e book, INTERNET, bar coding, fiber optics, RFID, etc have taken place. Now a days, there are various types of libraries like: traditional, automated, electronic, digital, and virtual libraries. There is a difference of opinion among library and information professionals about the meaning of the above said libraries at the outset. As the Internet expands, particularly the World Wide Web (WWW), more people are recognizing the need to search indexed collections. The major objectives of digital libraries are: to collect, store, organize and retrieve digital information; to provide effective and efficient digital information services; to minimize massive storage and space problem in libraries; to share the networked information; and to perform the various library activities economically.

INTRODUCTION

The term "Library" invokes in one's mind a storehouse of information in the form of paper publication like books, conference proceedings, annual reports, monographs, journals, etc. and also of documents in other forms like films, filmstrips, audio and video cassettes, CDs, etc. The term "digital" is actually somewhat of a misnomer. Digital libraries basically store materials in electronic format and manipulate large collections of those materials effectively. The key technological issues are how to search and display desired selections from and across large collections. In this era of the Internet and the World Wide Web, the long-time topic of digital libraries has suddenly become quite hot. As the Internet expands, particularly the World Wide Web (WWW), more people are recognizing the need to search indexed collections. The Internet and WWW technologies are providing the technological environment and intellectual impetus for the development of 'digital libraries'. The Internet has enabled global connectivity of computers and the development of various tools and techniques for networked information provision and access. Any information is just a click ahead to the user as he/she can access the required information on Internet on just a click of mouse. The fantastic tools like messaging (email), ftp, and telnet provide user-friendly tools like Gopher, WAIS and the WWW for information access.

DIGITAL LIBRARY DEFINITIONS

The meaning of term "digital library" is less transparent than one might expect. The words conjure up images of cutting-edge computer and information science research. They are invoked to describe what some assert to be radically new kinds of practices for the management and use of information. Digital library is an evolving area of

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research, development and application. Workers in this area have offered multiple definitions.

Edward Fox has defined the digital library as "the new way of carrying out the functions of libraries encompassing new types of information resources, new approaches to acquisition, new methods of storage and preservation, new approaches to classification and cataloguing, intensive use of electronic systems and networks and dramatic shifts in intellectual, organizational and electronic processes." [1]

In ODLIS (Online Dictionary of Library and Information Science) digital library has been defined as "A library in which a significant proportion of the resources are available in Machine-Readable format, as opposed to print or microform." [2] William T Arms defined the term digital library as "a managed collection of information, with associated services, where the information is stored in digital formats and accessible over a network".[3] According to C L Borgman, the term digital library has various meanings and these cluster around two themes: 1. From a research perspective, digital libraries are content collected and organized on behalf of user communities. 2. From a library-practice perspective, digital libraries are institutions or organizations that provide information services in digital forms.[4]

Digital Library Federation crafted the following definition:

"Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities."[5]

This is a full definition by any measure and a good working definition because it is broad enough to comprehend other uses of term. Therefore, operationally digital libraries will be network based distributed systems with individual servers responsible for maintaining local collections of digital documents ranging from sets of electronic texts to video-on-demand services. Any given digital library system should provide a coherent, consistent view of as many as of these repositories as possible and allow users to seamlessly connect and interact with information with no regard to geographic location or time.

COMPONENTS OF DIGITAL LIBRARIES

The key components of digital libraries are:

- Geographically distributed digital information collections
- Geographically distributed users
- Information represented by a variety of digital objects
- Large and diverse collections
- Seamless access

OBJECTIVES

The major objectives of a digital library are listed as under:

1. To collect store, organize and retrieve digital information
2. To provide effective and efficient digital information services
3. To minimize massive storage and space problem in libraries
4. To share the networked information
5. To save the time of library staff as well as

users

6. To perform various library activities economically

7. Ultimately to satisfy the users' requirement

DIGITAL LIBRARY SOFTWARES:

A number of digital library softwares that aim to offer stand-alone catalogues or complete digital library solutions are available. Each of these has its different functionality. Some of important digital library softwares are discussed below.

1. Greenstone Digital Library Software:

Roger McNab and Stefan Boddie developed this software for the New Zealand Digital Library Project at the University of Waikato. This programme was a research project aiming to develop the underlying technology for digital libraries and make it available publicly so that others can use it to create their own digital collections. Greenstone is a suite of software for building and distributing the digital library collection. The software organizes the information digitally for publishing it in digital form i.e. on the INTERNET or on CD-ROM. Greenstone is developed and distributed in cooperation with UNESCO and an NGO namely Human Info. The software is an open source software available at http://greenstone.org under the term of the GNU General Public License. The software is easy to install. Various versions of greenstone are available for Windows 3.X, 9.X, Unix as well as Linux also. Documentation of the software is also available online and the same can be downloaded in PDF format from the website. However some other associative softwares: like Apache Web Server, Perl, GCC, GDBM, etc are also required with greenstone. The software can be used to construct and present the digital collections of thousands of documents, texts, images, audio and video information. Greenstone also provides facility of searching these collections for particular words or combination of words using Boolean operators. The software has plug-ins that will automatically transfer word, PDF, and other plain text files into the HTML. Greenstone is multilingual as the Unicode character set is used throughout and is converted on-the-fly to an encoding supported by the user's web browser.

2. Ganesha Digital Library (GDL)

Software: Ganesha Digital Library Software is developed by the Indonesian Digital Library Network (the first digital library network in Indonesia). The development of GDL was pioneered and driven by the Knowledge Management Research Group at the Institut Teknologi Bandung, Indonesia. The software was developed in collaboration with other librarians and information engineers. GDL can be downloaded free of cost from its website (http://gdl.itb.ac.id/download/). Currently GDL is the most widely used application by Indonesia Digital Library Network Partners. GDL runs on Apache web server that support PHP version 4.04 and above. The software uses MySQL database server. For full-featured installation GDL should be installed on Linux/ Unix machine. The minimum requirement for GDL is Windows 95 or higher version.

3. iVia Open Source Digital Library System:

National Leadership grant program of the U. S. Institute of Museum and Library Services, the Fund for the Improvement of Post-Secondary Education (US Department of Education), and the University of California Library, Riverside funded the iVia project. The software is an open source Internet subject portal or virtual library system. The software enables institutions to work cooperatively or individually to provide

well-organized, virtual library collections of metadata descriptions of Internet and other resources. As well as rich full-text harvested from these resources. The software is a fast, reliable and robust system, which can be scaled to millions of records and users. It has an array of web Crawlers, which are capable of fully to semi automating the identification of significant Internet resources. It support various standards like: Open Archive Protocol for Metadata Harvesting, Dublin Core System, MARC format for bibliographic data, LC Subject Headings, and LC classifications.

4. GNU E-prints Archiving Software:

E-prints software has been developed as part of the digital library project at University of Southampton, U K. The software is available free of cost under the terms of GNU General Public License. The software runs under Linux and creates online archive libraries of electronic prints. The default configuration creates a research paper archive, but could be modified and used for other purposes. It is easy to install. The latest version of the software is 2.2.1. The software can be downloaded from its website (http://www.eprints.org). The additional software required are GNU Linux, Apache Web Server, Perl Programming language, mod_perl module for Apache server which significantly increase the performance of Perl scripts and MySQL database.

5. CONTENTdm Software: CONTENTdm:

is the commercialized version of the Content Software developed at the university of Washington. Digital Media Management Inc distributes this software. The software is flexible and multifunction package, which provides tools for all aspects of digital collection management. It can handle virtually all media types and meets the needs of a wide range of users. The software is a priced one and the complete CONTENTdm Software Suite is available at the entry-level price of $6000/-. Separate pricing information for libraries museums and nonprofit archive association can be sought from Online Computer Library Center Inc. (http://www.ocloc.org). The functionality of the software allows creating collections quickly and easily using a simple point and click interface. The "LC Thesaurus for Graphical Materials I" is supplied as controlled vocabulary or users can import or develop their own controlled vocabulary.

6. University of Michigan DLXS-XPAT Software:

The University of Michigan Library under Digital Library eXtension Service (DLXS) provides the foundation and framework for educational and non-profit institutions to fully develop their digital library collections. It offers free access to its "Set of Classes" with associated middleware (software), which communicates with the commercially available search engine X-PAT. The source code of various classes and middleware is open and can be downloaded from the website (URL: http://lib.umich.edu/newnow/freesoftware.html). The search engine XPAT is a powerful, SGML/XML-aware search engine, and an ultra-versatile tool for the development of digital libraries. XPAT provides excellent support for word and phrase searching, indexing of SGML elements and attributes, a baseline of support for XML, fast retrieval, and open systems integration.

7. Ages Digital Library Software:

The Ages Software Inc. supplies the Ages Digital Library Software. The Incorporation supplies the digital library collections or a particular e-book(s) from those collections either online or supplied on CD-ROM. Ages Digital Library Software is for ready to use digital collections from the Ages software. The software

is actually an accompanying software, which is supplied with e-books and other material supplied by the Ages software Inc. The software is useful for viewing or reading and searching the e-material supplied by Ages Software Inc.

8. Libronix Digital Library System:

Libronix Digital Library System is the refined version of Logos Library System from Logos Research Systems. This is a modular technology used to deliver the digital libraries of books and interactive study tools. The software has modular structure and it is Internet integrated. It is more like a toolkit for delivering the digital libraries than a single software package. The software is multilingual and support Arabic and Asian languages. According to Libronix DL System "For the first time data in multiple formats can be catalogued, browsed, searched and annotated from a common software interface. Libronix represents the logical next step beyond digital books by elegantly addressing all five key functions of a digital library system". The software can be downloaded from the website (http://www.logos.com/products).

A variety of Digital Library softwares are available now-a-days. These ranges from the outputs of Digital Library Projects to specific purpose custom applications. Some of these are available free of cost, whereas other are priced one. Keeping in view their functionality, these can be categorized in three different categories. First category consists of those, which are General Purpose but powerful, multi platform, multifunctional, multilingual and suitable for the requirement of the medium to large organizations such as Greenstone DLS, CONTENTdm, Ganesha DLS, and UM DLXS-XPAT DLS. The second category includes those software, which are specific purpose packages like: E-prints, iVia. The softwares suitable for small Individual's DL collection and e-book software form the third category. [6]

DIGITAL LIBRARY INITIATIVES IN INDIA:

National Task Force in Information Technology and Software Development submitted "IT Action Plan" to Govt. of India on July 4, 1998. The report contains 131 sections. The IT Policy of India is a comprehensive framework required for creating an ambience for the accelerated flow of investment into IT sector, with specific orientation towards the Software Industry to make India a global IT super power by ensuring the export of software of billions of dollars and IT for all by 2008. This is really an encouraging development for the "info-poor" India. [7]

A few relevant sections of the Chapter 5 entitled "Content Creation and Content Industry" of the IT Action Plan (Part III) Long Term National IT Policy of India read as under:

81. It will be made mandatory for all the universities or deemed universities in the country to host every dissertation/ thesis submitted for research degrees on a designated Website.

83. The national, regional and other public libraries will be required to develop databases of their holdings, which will be hosted on a designated Website for free access to users.

84. The Government in association with the industry will evolve appropriate guidelines, codes and systems to ensure those materials anti-social, unsuitable, illegal or posing a threat to national security are not put on the Websites.

85. The Indian Language based systems are crucial for the growth of the content industry and for spreading the impact of IT to the grass root level. All Government funded software tools developed, for handling information in Indian languages, will be actively promoted for

widespread use and made available at nominal cost.

90. There is a need to promote and encourage hosting of non-commercial materials related to linguistic, social and cultural aspects of people by the public or private organizations. The Government will take initiative for providing web sites, free of cost, for such purposes.

91. Government will encourage and promote Indian companies and organizations to host their contents only on web servers located in India with Indian domain addresses and these will be made available at internationally competitive prices. Any information hosted on these sites will follow the guidelines evolved by the Government in association with the industry.

92. For enabling Inter-operability between equipment, data, practices and procedures, Standards will be evolved to integrate hardware, software and communication systems and to exchange information across boundaries of different systems.

93. Creation of knowledge bases requires trained manpower for collection, compilation, analysis and production of value added information products and services. Specialized training programmes, through existing institutions, will be initiated to meet the requirement of trained professionals in these areas. Traditional curriculum being offered by the universities and educational institutions in various fields related to content industry will be suitably modified, such as library science, journalism and mass communication.

99. A pilot project on digital library development, based on indigenous software, will be initiated. The project will be time-bound and implemented at one of the suitable existing libraries to serve as a model. The software so developed can be distributed to other organizations to accelerate the development of digital libraries in the country.

100. Virtual libraries provide extensive information and instant access to users through information networks. The Government will promote a pilot project for creation of a model virtual library. The virtual library will be enabled to work out suitable copyright arrangements with the relevant publishers for providing the service.

101. A National Internet Center of Excellence (NICE) will be established in an existing institution to promote standards, assist digital content development in India, devise standards for content building and delivery, and research new technologies.

It is a matter of fact that the development of digital libraries in India is not up to the mark. Although the provisions for the development of digital libraries are clearly mentioned in the IT Action Plan, but the implementation of this plan at war footing is required. A number of digital libraries have already been established in India such as Health Education Library for People (HELP), Mumbai; Indian Institute of Technology, Kharagpur; National Centre for Science Information (NCSI), Banglore; SSPL Digital Library; National Institute of Technology (formerly Regional Engineering College), Warangal; etc. Still a lot of work is being carried out to create digital libraries. Numerous institutions like: University of Hyderabad, Hyderabad; National Institute of Mental Health and Neuroscience, Banglore; All India Institute of Medical Sciences (AIIMS) New Delhi; National Informatics Center (NIC), New Delhi, etc are in the process of creating digital libraries.

ADVANTAGES OF DIGITAL LIBRARIES

In the era of information technology Digital Libraries have certainly numerous advantages. Some of these are described as under.

1. Use of computer power: Nowadays computers are available which can process the data at very high speed. These computers are also capable of storing a huge amount of data. Due to development in computer technology, it is feasible to digitize, process and retrieve information in the form of text, high quality graphics, images, voice and vedio at a low cost. Furthermore this digital information can also be shared to other users through a network. The invention of Hyper Text Markup Language and emergence of advanced web browsers have provided users friendly interface. On a mouse click a user can access to vast amount of information stored on millions of web servers spread all over the world. One stop shopping centers such as BUBL (Bulletin Board for Libraries [http://bulbl.ac.uk]) and SOSIG (Social Science Information Gateway [http://www.sosig.ac.uk]) provide massive access to quality information. With the emergence of the Internet, globalization of information is taking place and we are moving from just-in-case to just-in-time model of access to information. No doubt we can take advantages of computer power through the digital librarie

2. Information sharing: In case of traditional libraries, there are printed documents and users have to scan a number of documents to get the desired piece of information. For this purpose he/ she has to visit the library for consulting or getting the document issued. On the other hand until that user uses that particular document, no other user can make use of that document. But contrary to this, digital information can be shared on a Local Area Network or even on Internet. More than one user can access the same information on their desktop. Hence information can be shared through the digital libraries.

3. Remote access: To consult the traditional libraries, the users have to visit the libraries. But digital libraries brought the libraries to the doorstep of users. A digital library can be accessed from the computer terminal lying on the desktop of a user. The users can access the digital library from hostel or residence or shop, etc. In the era of digital libraries no longer users are required to visit the library. A user by sitting in one corner of the world can access a digital library in the other corner of world without wasting time. For this he only needs a computer connected to that digital library though the Internet.

4. Up-to-date Information: One of the characteristics of information is its currency. Information is useful until it loses its currency. The outdated information solves no problem. In the printed versions of information the revisions of information takes huge time and it is a tedious job also. To revise some portion of the document, it needs thoroughly revision. On contrary, if information is stored in digital format we can update this as soon as we notice the latest development without much labour and time. The information in digital form can be kept more updated as compared to the printed.

5. Seamless access: In the mode of traditional libraries, users can access information as longer as the library is open. With some exceptions, each and every library has a limited period of operation. Only a few libraries in India function round the clock and round the year. But digital libraries can be accessed round the clock and round the year. The users of digital libraries have no need to note the time of operation of their library. In digital libraries, materials are never borrowed by the user, nor wrongly shelved, nor

stolen. In other words we can say that each piece of information is available at the disposal of the user waiting for his mouse click.

6. Preservation of rare material: In libraries some material is available which is very rare in nature. For example if a library has a good collection of manuscripts. The manuscripts are so old that if some one uses these the same get broken. Further these are very difficult to preserve for future use. The only way of preserving this rare material is to digitize such type of collection and store the digitized material permanently for future use. The digitization of rare material not only preserves the material but also facilitate its use. The same rare material (which was not in usable condition) in digital form can be used as much times as the users wish.

Apart from the above-mentioned advantages of digital libraries there are numerous advantages of digital libraries which can't be covered in this article due to limited space.

CONCLUSION

The semantics of the synergy between information and the technology associated with it lie in the real needs of the society. This synergy will continue sine die. It is for us to decide how we are to take advantages of this synergy. An opportunity is available to us for enhancing our access to global information. The only way is to digitize the information and integrate the same through the networks. This will create a global virtual community with a vast storehouse of knowledge and a continuous dialogue among its members.

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