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## VERSATILE WORLD OF LIBRARIES IN DIGITAL ENVIRONMENT

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### Abstract

*Innovations in Information and Communication Technology (ICT) have been changing all spheres of lives. Libraries are tremendously changed with the impact of ICT on its day-to-day routines. Through this paper an attempt is being made to highlight the growth of libraries from private or personal library to digital and virtual library. We are in era of digital library but in true sense presently, hybrid libraries are dominating structure of libraries. Increasing information demands of the user insisting library professionals to keep virtual library as their target library, which is fixed to be complete with the development of ICT.*

**Keywords:** Digital library, Institutional repository, Open Source software, Open achieve, Virtual Library

### 1. Introduction

“Library is an growing organism”, the Fifth law given by Dr. S R Ranganathan is most appropriate and very much applicable in all forms of Information. The librarianship from close access is reached to open access. The tools involved in generation, collection and dissemination of information have already been changing with innovations in the area of Information and Communication Technology (ICT).

### 2. Generations of Libraries

#### 2.1 Personal/Private Libraries

In the beginning emperors or kings used to keep collection of documents for their personal use. These type of libraries usually restricted to upper class people, high society, scholars or theologians. These libraries contained unpublished material and more or less worked similar to private archive. The emergence of libraries expected way back in the 500 BC. The collections were physical items, contained clay tables, coins, etc. Today, we are talking about ancient or manuscripts mostly surviving texts/objects from these type of ancient libraries. There was no classification scheme to place and two locate the needed item but documents were placed according to colour or size etc.

#### 2.2 Traditional Libraries

In this generation of libraries emphasis on storage of physical items, particularly books and periodicals. Arrangement and retrieving of the needed documents were given high priority in the libraries. All

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the collections were placed at one place and users must travel to the library to know what is in the library and make use of it. But with the time various problems were faced by traditional libraries like, space problem, acceleration in the growth of published literature, price hike for the scholarly information, etc., and existence of computer gave birth to electronic library.

### **2.3 Electronic Libraries**

In this library most of the collection is available in electronic form only e.g. CD ROMs, audio and videocassettes, floppy diskette, etc must be the part of this generation of libraries. But the problems occurred in this group leads to the flap of Digital Libraries. The problems faced by the library manager as well as the users in electronic libraries are:

- Many of the documents (CDs, Floppies, Audio or Video cassettes) need specific operating machine to explore the recorded information.
- In case of abstracts in CD form, after getting the up to date version, older version is not of any use.
- Growth of WWW (World Wide Web) on the Internet, leads to digital library.
- Diversified need and approach of the users to the information.
- Innovations in ICT give publishing industry, users and managers of information a new way-out to produce, manage, distribute and use of information. So publishing industry come out with online resources as the solution of subscription to every updated piece.
- Information become as primary need of the human beings and wealth of information is being considered as foremost than other entities by the nations or by people. Production, management, use and dissemination of information etc are well equipped with the help of Internet. Therefore, dissemination of latest and authentic information in speedy way up to the end users is the prominent priorities for the information managers.

### **2.4 Hybrid Library**

Hybrid library is the combination or mixture of all the libraries. It is neither full traditional library nor full digital library. Presently most of the libraries are of this nature only and accommodating all types of information formats for the users. These contain information in Floppies, Audio- visual cassettes, CD ROMs, Print documents and, E-resources etc. In the era of transition many users are not comfortable with latest technologies so keeping all form of documents and user awareness programmes to handle latest technology are common in practice.

### **2.5 Digital Library**

Maintained a digital library has become a status symbol for institutions now-days. Librarianship has already accommodated computer as an important tool to serve the users way back in 1950s. With advent of world wide web (WWW) information service to the end user is the key target for the professionals. To provide information service, professionals have to go for art-of-the-technology as mode of communication, to collect and manage the available literature. In simple words a digital library is the library where information, in the form of bits and bytes and the pieces of information are being called as digital objects. Therefore, to establish and maintain a digital library is itself a simple and unique system, which comprises with various independent sub-systems.

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- **Collection Infrastructure (Digital Objects):** The main element of this part is conversion of content from physical to digital form. It can be two types Born digital HTML, TXT, TEXT, XML, DOC, PDF, MPEG, JPEG, etc. and Print documents which contains physical library collection.
    - **What to Digitize? (contents):** users want intellectual contents or information not the ordinary or general one. Therefore, one should be very careful while selecting the contents to digitize for digital library. Digitization must be according to the importance of contents for maximum users.
    - **How to Digitize? (tools etc.):** tools or infrastructure required for building a digital library are based on the nature and services of the digital library. For digitizing contents, cameras with high pixel, scanner etc. we can also called these as input devices.
  - **Access/Search (User Interface):** user interface is most important part of digital library. Once the contents are ready in digital forms, these should be accessible by its users through user-friendly interface. It is also important to manage all the digitize contents in a systematic way. Therefore, well-developed software can play a vital role and use of open source software, which are available now days, are advisable.
  - **Network of Digital Library (Server + Client):** In this part digital library provide centralized searching for physically distributed contents and distributed searching for centralized collection through Server and Client mode. Integrated software, text indexing, search engine facility with protocol Z39.50 compliance and metadata harvesting protocols will be the better choice.
  - **Web based access (Global Access):** the digital library can include digital contents in different formats and all these formats need to be organized to make accessible to users. Therefore, Internet protocols have to be taken care in this sub system by addressing Uniform Resource Locator (URL), Persistent Uniform Resources Locator (PURL), Digital Object Identifier (DOI), etc.

Building a digital library is based on various factors and needs:

1. Digital library speed up the development of any library system by collecting, storing and organizing scholarly information in digital form to help the retrieval and dissemination process.
2. It promotes the economical and efficient delivery of information to all members of the library.
3. Digital library is very much suitable and helpful to encourage co-operative venture, which leverage the considerable investment of the nation or group of institutions.
4. It is also helpful to strengthen the communication and collaboration between and among the research, business, government and academic communities.
5. Digital library is keeping the motive of to contribute in the lifelong learning opportunities to all its members or users.
6. Digital library is the process to preserve the ancient, historical and rare collection for the posterity.

Digital libraries can be divided in various groups, like Digital archive, Open archive, Institutional repository etc.

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**Digital Archive:** Digital archive is the special archive, which holds old and rare contents of information. Mainly these are at national or public interest to preserve the information to the posterity. Digital Archive also holds the specific type of information for special use.

**Open Archive:** Open archive is latest trend, in which information is available freely to access, download and use to all the human beings and available through the Internet. Mostly non-governmental organizations (NGOs) and Publishing societies are providing this service to their scholarly research papers or reports.

**Institutional Repository:** An institutional repository is to capture, store, manage and make available the research output of an institution or university or any agency. Various software are available to build an institutional repository like CDSware, Dspace, Eprints, Fedora, Greenstone etc., are name of few.

- **CDSware:** CERN Document Server Software (CDSware) is the software to maintain and made publicly available by CERN (European Organization for Nuclear Research) and supports electronic preprint servers, online catalogues and other web-based document depository systems.
- **Dspace:** DSpace is a joint project of the MIT (Massachusetts Institute of Technology's libraries) and Hewlett-Packard (HP) Labs and it is freely available to research institutions world-wide as an open source system that can be customized and extended. DSpace is being considered as an institutional repository digital library system. It has been organized to accommodate the multidisciplinary and organizational needs of a large institution/university. It provides access to the digital work of the whole institution/university through one interface. It accepts any type of digital content, including: text, images, audio, video, scanned version of documents such as articles, preprints, working papers, technical reports, conference papers, books, theses, data sets, computer programs, visual simulations and models, and gives the flexibility to the institution to determine its own list of supported formats according to its needs and resources.
- **Eprints:** The Eprints software has the largest—and most broadly distributed—installed base of any of the repository software systems described here. Developed at the University of Southampton, the first version of the system was publicly released in late 2000. The project was originally sponsored by CogPrints, but is now supported by JISC, as part of the Open Citation Project, and by NSF. Eprints' worldwide installed base affords an extensive support network for new implementations. The size of the installed base for Eprints suggests that an institution can get it up and running relatively quickly and with a minimum of technical expertise.
- **Fedora:** The Flexible Extensible Digital Object and Repository Architecture (Fedora) is a digital object repository management system, jointly developed by the University of Virginia and Cornell University. The system is designed to be a foundation upon which full-featured institutional repositories and other interoperable web-based digital libraries can be built.
- **Greenstone Digital Library Software (GDLS):** It is open-source software and can be downloaded from its main website. The aim of the software is to allow users to build their own digital libraries. Languages in which Greenstone is available are: English, French, Spanish, Russian, Kazakh and Vietnamese. Greenstone runs on Windows, UNIX and Mac OS X and it can be customized. It can be installed in two ways, for a local library it requires Greenston

software and Java virtual environment and for Web Library it requires Greenstone Software, Java virtual environment and Apache or IIS Web server running. Greenstone digital library software provides a flexible way of organizing information and publishing it on the Internet or removable media such as CD-ROM.

Some of the old and prominent Institutional repositories available in India are:

S.No	Institutional Repository	Contents
1	Bioinformation <a href="http://www.bioinformation.net/">http://www.bioinformation.net/</a>	Bioinformation publishes original research articles in all aspects of biological knowledge discovery through mathematical and computational analysis of biological data. The journal specifically invites articles describing new biological insights based on primary or derived data. 100% freely accessible full-text.
2	INFLIBNET Centre <a href="http://dspace.inflibnet.ac.in/">http://dspace.inflibnet.ac.in/</a>	Post-prints, preprints, news clippings, conference articles, training materials and other scholarly publications Total OAI Records: 428
3	University of Hyderabad <a href="http://202.41.85.207:8080/dspace/index.jsp">http://202.41.85.207:8080/dspace/index.jsp</a>	Using dspace for institutional repository which contains research reports, various research publications, general articles, etc. and all these are 100% freely accessiblefulltext
4	Indian Institute of Astrophysics <a href="http://prints.iap.res.in/">http://prints.iap.res.in/</a>	The Indian Institute of Astrophysics is a premier national centre devoted to research in astronomy, astrophysics and related physics. It traces its origin back to an observatory set up in 1786 at Madras which from the year 1792 began to formally function at its Nungambakkam premises as the Madras Observatory. With headquarters at Bangalore. Dspace at IIA contains research papers, reports, Ph.D theses, Newspaper clippings, photographs etc. with total number of 1180 records.
5	National Institute of Technology, Rourkela <a href="http://dspace.nitrkl.ac.in/dspace">http://dspace.nitrkl.ac.in/dspace</a>	Dspace@nitr collects,preserves and disseminates the intellectual ouput of NITR to the global audience. Presently, it archives journal articles, pre-prints and conference papers authored by NITR researchers. Total : OAI Records available with this repository are 317.
6	University of Delhi <a href="http://eprints.du.ac.in/">http://eprints.du.ac.in/</a>	University of Delhi is maintaining an Institutional repository, which is containing around 110 full text records.

7	Indian Institute of Management Kozhikode <a href="http://eprints.iimk.ac.in/">http://eprints.iimk.ac.in/</a>	Indian Institute of Management Kozhikode Scholarly Repository. institutional repository, a scholarly archiving facility for the IIMK community, using the GNU EPrints software, developed at the University of Southampton. This service enables the Institute community to archive their preprints, post prints and other scholarly publications. 100% freely accessible fulltext
8	Indian Institute of Management Kozhikode <a href="http://dspace.iimk.ac.in/">http://dspace.iimk.ac.in/</a>	Research Institutional or Departmental Welcome to IIMK's institutional repository, a scholarly archiving facility for the IIMK community, using the BSD DSpace software, Jointly developed by MIT Libraries and Hewlett-Packard Labs. This service enables the Institute community to archive their preprints, post prints and other scholarly publications. In keeping with the objectives of the Open Access movement, we expect this service to facilitate the Institute researchers in self-archiving and long-term preservation of their scholarly publications, provide easy access to these publications world wide and improve impact of their research. While dspace@iimk can be accessed by anybody, submission of documents to this archive is limited to the IIMK research community. Total OAI Records: 173
9	Indian Institute of Science Bangalore <a href="http://etd.ncsi.iisc.ernet.in/">http://etd.ncsi.iisc.ernet.in/</a>	Theses and Dissertations of Indian Institute of Science, Bangalore, India. You can search, browse and access theses and dissertations from this collection. This repository has been developed to capture, disseminate and preserve research theses of Indian Institute of Science. It complements ePrints@IISc, the research publications repository of IISc and contains 186 full-text records.
10	Indian Institute of Science, Bangalore <a href="http://eprints.iisc.ernet.in/">http://eprints.iisc.ernet.in/</a>	This repository is containing full text 5557 records of scholarly nature and available freely.
11	Indian Institute of Information Technology, Allahabad	Testing Phase 100% freely accessible fulltext
12	Indian Statistics Institute, Bangalore <a href="http://library.isibang.ac.in:8080/dspace/">http://library.isibang.ac.in:8080/dspace/</a>	Contains general information on Mathematics, Quality Management and some information on Dr. S R Ranganathan apart from news clippings etc.
13	Librarians' Digital Archival Library <a href="https://drtc.isibang.ac.in/index.jsp">https://drtc.isibang.ac.in/index.jsp</a>	DRTC Bangalore is maintaining Librarians' Digital Archival Library, which is one of the advanced archival libraries containing scholarly information on Library and Information science area. 100% freely accessible 256 records.

14	National Informatics Centre, India <a href="http://openmed.nic.in/">http://openmed.nic.in/</a>	<a href="#">OpenMED@NIC</a> is an open access archive for Medical and Allied Sciences. Here authors / owners can self-archive their scientific and technical documents. For <a href="#">this they need to register once in order to obtain a user id</a> in OpenMED system. However no registration is required for searching the archive or viewing the documents. Around 1300 full text records are available in this archive.
15	National Aerospace Laboratories Institutional <a href="http://nal-ir.nal.res.in/">http://nal-ir.nal.res.in/</a>	Research Institutional or Departmental NAL's Institutional Repository is the digital archive of Repository the research output of our scientists. This knowledge base covers journal articles, conference papers, technical reports, presentation/ lectures, preprints, Thesis, images etc. Total 1632 records are available in this repository.
16	National Chemical Laboratory <a href="http://dspace.ncl.res.in/">http://dspace.ncl.res.in/</a>	Dspace@NCL repository collects, preserves and disseminates in digital format the research output created by the NCL research community. It enables the Institute community to deposit their preprints, postprints and other scholarly publications using a web interface, and organizes these publications for easy retrieval. Total 357 records are available and 100% freely accessible upto fulltext level.
17	National Institute of Oceanography <a href="http://drs.nio.org/">http://drs.nio.org/</a>	Digital Repository Service of National Institute of Oceanography, India. DRS@nio tries to collect, preserve and disseminate different institutional publications (journal articles, conference proceeding articles, Technical reports, thesis, dissertations, etc). One can search, browse and access publications of NIO from this collection. Total 423 full texts are available in this repository.
18	One World South Asia's Open Archive Initiatives <a href="http://open.ekduniya.net/">http://open.ekduniya.net/</a>	OneWorld South Asia (OWSA) launches open archive initiative to promote sharing of development thoughts for peer review using open archiving software customised to suit the need.
19	Raman Research Institute <a href="http://dspace.rri.res.in/">http://dspace.rri.res.in/</a>	This contains the research publications of the faculty Digital Repository and students of this institute. The Annual Reports of RRI and Newspaper Clippings from the Raman Archives are also housed here and total around 1377 fully searchable records are available in this repository.

Table is based on the information available at <http://archives.eprints.org/>

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## 2.6 Virtual Libraries

Virtual library is the concept based on integration of all the existing digital libraries through Internet. Once process of digitization will complete and traditional, electronic and hybrid libraries were converted into digital form will give the shape to virtual library. In virtual library user needs system with Internet facility. If one is in need of information then s/he doesn't have to go into the library physically. S/he can access any page of any document published in this world from his or her desktop. WWW (World Wide Web) is a good example of virtual library but the information available at virtual library will be factual and authentic.

## 3. Conclusion

Growth of library system is perpetuating. With the help of ICT library professionals are able to keep bibliographical control up to much extent, on the literature that is being published day by day in, all over the world. In form of digital library not even an institution but an individual can also built personal digital library. Today world is witnessing various digital libraries in form of digital archives, institutional repositories and personal digital libraries but the major issues which have to be seriously addressed are authenticity of the digitized information and copyright issues to protect the author's or publisher's right while using this information. However, libraries are in right direction to accommodate the challenges put in the form of latest and scholarly information to by the user community. Digital libraries are the way out to provide right information to the right user at the right time.

## Reference

1. Arms, W Y, Blanchi, C and Overly, E A, (1997) 'An Architecture for Information in Digital Libraries'; D-Lib Magazine. Accessed on August 2006 at <http://www.dlib.org/dlib/february97/cnri/02arms1.html>
2. Budapest Open Access Initiative accessed on August 2006 at <http://www.soros.org/openaccess/software/>
3. Caroline R. Arms, (1996), 'Historical Collections for the National Digital Library: Lessons and Challenges at the Library of Congress'. D-Lib Magazine. Part 1, from (<http://www.dlib.org/dlib/april96/loc/04c-arms.html>)
4. Joint, Nicolas (2006), 'Digital library futures: collection development or collection preservation?'; Library Review, Vol 55, No. 5. pp. 285-290.
5. <http://archives.eprints.org/> accessed on August 2006.