Digital Library: Components and Management

Dr. Nitin Kude
Librarian, Institute Of Management Technology, Nagpur, India

Abstract:
This paper discussed different mechanisms of the digital library, collection infrastructure, the digitization process involving selection, conservation and preservation, digital resource organization, digital library services and the scenario of digital libraries in India. It further discussed the IPR issues and digital right management

Key words: Digital Library, Component of Digital Library, Born Digital IPR Digital Right Management

1. Introduction
Today's libraries are hybrid in nature i.e. a combination of traditional and modern libraries. The term modern libraries encompass three concepts viz. (Difference between Electronic, Digital and Virtual Libraries, 2011) Electronic, Digital and Virtual Libraries. An electronic library is a library consisting of electronic materials and services. Electronic materials can include all digital materials, as well as a variety of analog formats that require electricity to use. A digital library is a library consisting of digital materials and services. Digital materials are items that are stored, processed and transferred via digital (binary) devices and networks. Digital services are services (such as reference assistance) that are delivered digitally over computer networks. These are the libraries "with walls as well as without walls"; it depends upon the way the users access it. Both digital and electronic libraries can be virtual libraries if they exist only virtually - that is, the library does not exist "in real life." These are libraries "without walls" and also known as web based libraries.
"An informal definition of a digital library is a managed collection of information, with associated services, where the information is stored in digital formats and accessible over a network." (Arms W., 2005)

2. Components of a Digital Library
Components required for a digital library can broadly be categorized into the following components (Arora, 2008)
- Collection Infrastructure
- Digital Resource Organization
- Access Infrastructure
- Computer and Network Infrastructure
- IPR and Digital Rights Management
- Digital Library Services

3. Collection Infrastructure
The collection infrastructure typically consists of two components, i.e. metadata and digital objects. The metadata provides bibliographic or index information for the digital objects. While digital objects are the primary documents that users are interested to access, it is metadata that facilitates their identification and location using a variety of search techniques.
The digital library collection can be developed in three ways
- Born Digital resources
- Buying Access to External Digital Collections
- Converting of Existing Print Media into Digital Format (Digitization)

3.1. Born Digital Resources
Ricky Erway has defined types of born digital resources viz. Digital photographs, digital documents, harvested we contents, digital manuscripts, electronic records, static datasets, dynamic data, digital art, digital media publications (CDs, DVDs, etc.). The libraries may frame policies to acquire, preserve and enrich the digital library collection by born digital resources. (Erway 2010)

3.2. Buying Access to External Digital Collections
The digital libraries can develop the collection by purchasing access to external digital collections like scholarly e-journals and bibliographic/full text database (J-STOR, Emerald, J-Gate, EBSCO, etc.) This also includes subscription to consortia viz INDEST-AICTE Consortium, CSIR E-Journals Consortium, UGC Info net Consortium, N-LlST, DAE Consortium, MCIT Consortium, 11M Libraries Consortium, FORSA Consortium, etc.

3.3. Converting of Existing Print Media into Digital Format (Digitization)
The collection of a digital library can be built up by conversion which converts analogue formats to digital formats.

4. Digitization Process
The digitization process involves three main steps i.e., Selection, Conversion and Preservation.

4.1. Selection
The process of selection of material for digitization involves identification, selection and prioritization of documents that are to be digitized. The documents should be selected for conversion based on the criteriaviz. Content, demand, condition and type of document.

4.2. Conversion
It involves following steps

4.3. Data Capture
The data can be captured by manual data entry, Imaging with scanners or digital camera and doing OCR (Optical Character Recognition). Electronic scanners are used for scanning of an electronic image into a computer through its original that may be a photograph, text, manuscript, etc.

4.4. Data Processing
Quality control is an important component in every stage of a digital imaging project. The captured data have to be processed in order to image enhancement, amplification, compression and to remove the noise in OCR processing. For this purpose special software can be used.

4.5. Storage
The most tenacious problem of a document image relates to its file size and, therefore, to its storage. The scanned images, therefore, need to be transferred from the hard disc of scanning workstation to an external large capacity storage device such as an optical disc, CD ROM / DVD ROM disc, NAS, etc.

4.6. Organizing and Indexing
It includes developing a metadata schema, assigning metadata and/or unique object identifier to each digital object, linking digital objects with associated metadata to facilitate browsing and searching, organizing digital objects and associated metadata into a database and building browse, search and navigational facilities.

4.7. Retrieval and Display
Typically, digital library software use database management system atthe backend, sophisticated search engines and user-friendly search interfaces as front-end to facilitate search and browsing of resources available in a digital library. Users are also allowed to refine their search strategy. Once the required images have been identified their associated document image can quickly be retrieved from the image storage device for display or printed output.

4.8. Preservation
The process of maintaining materials produced in digital formats in a condition suitable for use is a real challenge. Problems of physical preservation are compounded by the obsolescence of computer equipment, software and storage media. Migration, Replication, Emulation, Refreshing, Metadata Attachment, Trustworthy digital Objects, Normalization, Bit stream Copying, Technology Preservation, Digital Archeology, Analog Backups, Encapsulation etc. are the digital preservation strategies used in digital libraries.

5. Digital Resource Organization

Classification schemes, Subject headings List, Thesaurus, Catalogues are the tools for resource organization in traditional libraries whereas addressing protocols, development of Metadata Schemes, assigning metadata to digital objects, assigning digital object identifier (DOl) to the digital objects, linking of objects with associated metadata for searching and browsing capabilities, organizing the digital objects with metadata in the database and building browsing and searching interfaces.

6. Access Infrastructure

This includes Search and Browsing Interface which facilitate Simple Search and Advanced Search with Boolean queries, wild cards, phrase searches and field- specific searches.

7. Networks and Computing Infrastructure

It includes hardware and software requirements. Servers, Nodes, Printers, Scanners, Digital Camera, Sound Recorders, etc. is the hardware requirement whereas System Software, Application Software, OCR Software, File Format converter, Web server, Database software, Antivirus, Networking software, Image enhancing, Compressing software are software requirements. Digital Library Software viz. Dspace, E- Print, Greenstone, Fedora, Academic Research in the Netherlands Online (ARNO), CERN Document Server Software (CDSware), I-TOR, MyCoRe, Archimede etc. are open source software.

8. Intellectual Property Rights (IPR) and Digital Rights Management

The developers of digital libraries are obliged to take permission for inclusion of copyrighted material in digital form or develop mechanisms for managing copyright, mechanisms that allow them to provide information without violating copyright. Digital Rights Management (DRM) refers to the technologies and processes that are applied to describe the digital content and to identify the user. Further it refers to the application and enforcement of the usage rules in a secure manner. The primary purpose of DRM is to control access, use and distribution; and thereby protect the interests of copyright holders in the online environment. The legal context for DRM is copyright law. The United States of America (USA) copyright and the European Union (EU) Countries have their DRM system derived from the World Intellectual Property Organization (WIPO) Copyright Treaty of 1996 (WCT). Most of the European countries have private copying provisions in their copyright laws, which allow consumers to create copies of the legitimately obtained content for their own use or that of family members (Rosenblatt 2007). In the online environment, the scope of DRM can be leveraged to control access to and usage of digital objects and to impose restrictions on their misuse. This can be achieved through

- Log-in ID and Password-based Access
- IP Based access
- Product Activation
- Fractional or Partial Access
- Control of the Interface
- Hardware Locks (Dongles)
- Digital Watermarking
- Cryptology

9. Digital Library Services

The major digital library services include

- OPAC to web PAC
- Digital Reference Service
- Library Chat Rooms
- Electronic Delivery Services
- Virtual Library Tours
- Ask-A-Librarian
- Real Time Services
- Bulletin Boards
- Web-based User Education Web Forms
- Frequently Asked Questions (FAQ)
- Selective Dissemination of Information in Digital Library: Delivering Customized Contents
- RSS Feeds

10. Digital Libraries: Indian Scenario

10.1. Library Consortium in India
- INDEST-AICTE Consortium (Govt.-funded)
- CSIR E-Journals Consortium (Govt-funded)
- UGC Info net Consortium (Govt.-funded).

- N-LJST
- DAE Consortium (Govt.-funded)
- MCIT Consortium (Govt.-funded)
- IIM Libraries Consortium
- FORSA Consortium
- Scholarly Science Journals
- Theses & Dissertations
- Vidyanidhi
- Shodhganga

11. Conclusion

Digital libraries are beneficial to all researchers, scholarly institutions and the entire research community. Building world standard digital libraries, as powerhouses of knowledge, that are able to address the complex issues put forth by the technology push as well as the demand pull are fast catching up worldwide attention. During the past five years India has been responding to this global trend quite proactively and positively and a number of institutions have started the initiatives in this direction. However building and maintaining digital libraries is a great challenge before library professionals.

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