Digital Library, Features, Strategies, Infrastructure and their Benefits for Users in Digital Era

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Abstract:

A digital library, unlike other forms of media such as print or microform, is a specialized form of library that encompasses a collection of digital assets. Such digital objects can be in the form of visual material, text, and audio or video that are in electronic media forms. As it is a library, it also has features to organize, store and retrieve media or files that make up the collection. Content in a digital library may also be stored locally or accessed by means of networks when stored remotely (Techopedia),thispaper is mainly high lights for digitalization of library based on their benefits, limitations, planning, infrastructure, hardware and software and so in details for library users.

Keywords: Digital Library, Software, Hardware, Benefits, Limitations.

1.Introduction:

Libraries are of different types and exist in many forms such as traditional, electronic library, digital library, virtual library, hybrid library etc. The advent of multimedia technology has given rise to image libraries, Audio Libraries, and Digital Libraries. Among these types of libraries, to-day digital becomes very popular. During this time, the libraries are welcoming digital resources born or created, as they are bringing a new kind of library culture. Process of digitization has brought sweeping changes in the profession.A digital library is an automated or electronic library, where activities like accessing, retrieval, processing, automatic indexing and textual analysis, with the help of a computer, assist resource sharing and storing. Digital libraries have become a feature on the landscape in developed countries.

- **Digital Library:** represents an organization that collects, manages, and preserves the rich digital content on behalf of users.
- **Digital Library System (DLS):** a software system that is based on a defined architecture and provides all functionality.
- **Digital Library Management System (DLMS):** a generic software system that provides the infrastructure to produce and administer a digital library

1.1.What's HOT Today?

- Being connected 24/7
- Blogs
- Cell phones & texting
- Citizen journalism
- Faceted browsing
- Fast delivery and vodcasting
- Folksonomies
- Gaming & virtual realities
- Instant gratification
- Mashups
- Metasearching
- Online photo sharing

- Open source ILS desktop applications
- Open World Cat
- OpenID or one-time
- Plugins, add-ons, & extensions authentication
- Podcasting, screen casting
- RSS feeds & aggregators
- Social bookmarking
- Social networking
- Tagging
- User comments and ratings
- Web applications replacing
- Widgets and gadgets
- Wikis

1.2.Definition:

- **Wikipedia:** A digital library, digital repository, or digital collection, is an online database of digital objects that can include text, still images, audio, video, or other digital media formats.
- **Duguid, Paul, (1997):** "The concept of a digital library is not merely equivalent to a digitized collection with information management tools. It is rather an environment to bring together collections, services and people in support of the full life cycle of creation, dissemination, use and preservation of data, information and knowledge."
- **Gladney, H.M., et.al (1994):** "A digital library service is an assemblage of digital computing, storage and communications machinery together with the software needed to reproduce emulates and extend the services provided by conventional libraries based on paper and other material means of collecting, storing, cataloguing, finding and disseminating information."
- A digital library is a collection of documents in organized electronic form, available on the Internet or on CD-ROM (compact-disk read-only memory) disks. Depending on the specific library, a user may be able to access magazine articles, books, papers, images, sound files, and videos.

1.3.Features of the Digital Library:

A Digital Library is expected to support the following features. They are,

- Accessibility from anywhere, home, school, Libraries, during travel and hostel etc.
- Added value
- Advanced search and retrieval
- Availability for long time.
- Digital materials often form part of a larger collection that comprises print materials
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- Easily accessible
- Greater opportunities for publishing
- Independent on specific hardware and software
- Information may be coupled with complex metadata structures
- Information resources can vary from simple text to multimedia available at one or several
- Information retrieval
- Multiple access.
- Network Accessibility
- No physical boundary
- Organized differently
- Preservation and conservation
- Providing access to more information than possible to physically acquire and maintain supporting both formal and informal learning.
- Providing access to very large information collections including access to primary and completed information.

- Round the clock availability
- Space
- Support traditional library system.
- Supporting multimedia content
- There are many complex issues of information retrieval, access management, and control of intellectual property rights, security, and authentication and so on.
- User can located anywhere and their nature, information needs, etc, may vary significantly
- User friendly Interface

1.4.Characteristics of digital libraries – (Cleveland, 1998):

- DLs are the digital face of traditional libraries that include both digital collections and traditional, fixed media collections. So they encompass both electronic and paper materials.
- DLs ideally provide a coherent view of all of the information contained within a library, no matter its form or format
- DLs will also include digital materials that exist outside the physical and administrative bounds of any one digital library
- DLs will include all the processes and services that are the backbone and nervous system of libraries. However, such traditional processes, though forming the basis digital library work, will have to be revised and enhanced to accommodate the differences between new digital media and traditional fixed media.
- DLs will require both the skills of librarians and well as those of computer scientists to be viable.
- DLs will serve particular communities or constituencies, as traditional libraries do now, though those communities may be widely dispersed throughout the network.

2.Why Digitization?

There are three main needs for digitization; two or all the three of them may apply to your digital library project.

- To preserve the Documents
- To make the documents more accessible
- To reuse the documents

2.1. Digital Trends for Libraries – (Axiell -2016):

- Big Data
- Blast from the past
- Ex Machina
- Internet of Relations
- Obsession with the present
- The AI Advisor
- The third place

2.2. Functional Components of Digital Library:

2.2.1. Indexing and Storage: This component carries out the indexing and storage of documents and metadata for efficient search and retrieval.

2.2.2. Organization: The key process involved in this component is the assignment of the metadata (bibliographic information) to each document being added to the collection.

2.2.3. Search and Retrieval: This is the digital library interface used by the end users to browse, search, retrieve and view the contents of the digital library. It is typically presented to the users as Hyper-Text Mark-up Language (HTML) page.

2.2.4. Selection and Acquisition: The typical processes covered in this component include the selection of documents to be added, the subscription of database and the digitization or conversion of documents to an appropriate digital form.

2.3. Function of Digital Library:

- Access to large amounts of information to users wherever they are and whenever they need it.
- Access to primary information sources.
- Advanced search and retrieval.
- Client-server architecture
- Hypertext links for navigation
- Integration with other digital libraries.
- Network accessibility on Intranet and Internet
- Support multimedia content along with text
- User-friendly interface

2.4. Basic Components:

- Digital Collection
- Human resources
- Infrastructure
- Systems function
- Telecommunication facility

2.5. Purpose of Digital Library:

- Expedite the systematic development of procedures to collect, store, and organize, information in digital form.
- Promote efficient delivery of information economically to all users.
- Encourage co-operative efforts in research resource, computing, and communication networks.
- Strengthen communication and collaboration between and among educational institutions.
- Take leadership role in the generation and dissemination of knowledge

3.Planning for Digital Library:

- Access
- Digitization
- Funding
- Furniture, equipment, and space
- IT Infrastructure
- Services
- Staffing

3.1. Digital Library Frameworks:

- Streams represent information flow and can be used to model content, which can be static (text, image) or dynamic (video).
- Structures support the organization of information in a usable and meaningful way.
- Spaces are collections of documents and are used in the context of access and presentation.
- Scenarios are used to describe user tasks and activities, which, in the context of digital libraries, can convey services.
- Societies refer to different communities of users; members have different roles and can undertake a range of activities.

3.2. Digital Library Technologies:

In Particular, the importance of understanding the human and social context while carrying out technical work remains the heart of all work in digital libraries. The basic technologies involved in Digital Libraries are;

- Componentized V/s Monolithic systems
- Interoperability (role of Z39.50, OAI etc.)
- Metadata mapping across different libraries
- Multilingual digital libraries
- OAI –compliant data and service providers
- Open architectures (open DLs)
- Publications tools
- Scalable digital library architectures
- Searching tools
- Unified interface for heterogeneous libraries

3.3. Required Infrastructure for developing Digital Libraries:

Seshaiah&Veeraanjaneyulu (2009) discussed the development of a digital library with the Greenstone Digital Library software and included the following steps:

- Building the digital collection
- Designing a user-friendly interface for viewing the collection
- Developing new collections from the file menu
- Dragging files to enrich the metadata
- Launching the librarian interface
- Selecting and applying metadata

3.4. Requirement for Digital Library:

The Internet and World Wide Web provide the impetus and technological environment for the development and operation of a digital library. The Internet provides the TCP/IP and or its associated protocol for accessing the information and web provide tools and technique for publishing the information over Internet. In the digital environment it is reasonable to say that a central back up or archive should be created at the national level, which will store information output of the region as well as information from outside the country. Some of the requirement for digital libraries is:

- **Audio visual**: Color T.V., V.C.R., D.V.D., Sound box, Telephone etc.
- **Computer**: Server, P.C. with multimedia, U.PS. etc
- **Network**: LAN, MAN, WAN, Internet etc.
- **Printer**: Laser printer, Dot matrix, Barcode printer, Digital graphic printer etc
- **Scanner**: H.P. Scan jet, flatbed, Sheet feeder, Drum scanner, Slide scanner, Microfilming scanner, Digital camera, Barcode scanner etc
- **Storage devices**: Optical storage device, CD-ROM, Jukebox etc.
- **Software**: Any suitable software, which is interconnected and suitable for LAN and WAN connection. Editing images
- Page layout programmers: to integrate text and graphics
- Page transferring utilities: to share files between computer platforms
- File translation programmes: to convert files from graphics
- File compression software.
- The software which are used mainly for digital library are Greenstone, Dienst Eprints Archive software, Dspace etc.

3.5. Creation of Digital Resources:

- Creation of local digital content available within the university
- Database of digital material that is open to all users over the campus-wide LAN.
- Electronic journals, and gradual elimination of print subscriptions
- Focus selectively on acquiring digital resources
- High bandwidth Internet connectivity
- Licensed databases

3.6. Importance of Digital Library:

- Access to cultural collections such as Cultural heritage, historical & special collections, museums, biodiversity.
- Archiving and preservation.
- E-governance such as improved access to government policies, plans, procedures, rules and regulations
- Scholarly communication, education, research such asE-journals, e-books, and data sets, e-learning.

4. Criteria:

- Delivery
- Digital collection
- Interface - access, physical, intellectual
- Organization - physical, intellectual
- Persistence
- User community

4.1. Strategies of Digital Library:

- To Create and/or acquire new digital information resources
- To Create mechanisms to involve other campus information provides/creators in the evolving campus wide efforts
- To Develop the necessary infrastructure
- To Provide integration and coordination of campus information resources

4.2. Digitization Policy:

As collection development policy is required to develop the best collection in a library, formulation of digitization policy is also essential to develop digital collection and resolve any conflicting issues arising later at any point of time. Such policy should primarily be based on the mission statement of the parent organization. It must further spell out the criteria five; a collection must meet to be considered for digitization, Such as,

- Accessibility to materials
- Audience
- Condition and kind of material
- Copyright issues
- Preservation issues

4.3. Resources of a Digital Library:

The Resources of a Digital Library are those, which the computer can store, organized, transmit and display without any intervening conversion process. It includes both print and electronic or digital material. The Digital Material may be of multimedia types or any other i.e. only Digital audio, Video, Full text information,

Photograph, Drawing, Digitized sound, e-book, v-book, Electronic tax, Map, Image, 3D representation etc. The Collection may also include Structured /Unstructured text, Scanned images, Graphic audios, Video recording etc

4.3.1. On - Line Resources:

- E-book, v-book, electronic tax, map, image, sound, video, and multimedia etc.
- E-journal
- LAN, MAN, WAN for web browsing, e- mail etc.
- Local database of traditional books in machine-readable form.
- Well trained manpower for online help

4.3.2. Off - Line Resources:

- C.D-ROM, Jukebox etc.
- Audio Visual Aid etc

4.4. Digital Library Services-(Musheer Ahmad Khan, 2013):

- Access to Web-Based Resources
- Ask-an-Expert
- Audio-visual Service
- Bibliographic Service
- Digital Archives
- Digital reference service
- E-Books
- E-Journals
- Electronic document delivery services
- Electronic Theses and Dissertations
- E-mail alerts
- ICT based new library services
- Institutional Repositories
- Internet Access
- Online Public Access Catalogue (OPAC)
- Real-time reference service
- Reference Service
- RSS feeds or Atom feeds
- Subject Gateways
- Web-based user education

5. Benefits, Drawbacks, Issues and challenges in Creating Digital Libraries:

5.1. Benefits of a Digital Library:

- Added value
- An important benefit offered by digital libraries is searching and browsing in material. One can optimize searching and simultaneously search the Internet, commercial databases, and library collections. Then one can save search results and conduct additional processing to narrow or qualify results, or click through search results to access the digitized content or locate additional items of interest.
- Arising new forms of information: information in digital form can support features and possibilities not given in print form.
- Cross references to other documents speed up the work of users
- Digital libraries are cost-saving, since expensive building, professional staff and maintenance demanded by conventional libraries not needed anymore.
- Digital libraries compared to conventional libraries allow collaboration and exchange of ideas.

- Digital libraries make it needless for the user to go somewhere. A user can get full information at home or at work, whenever there is a PC and a network collection.
- Duplicating of information is easy and cheap, whereas duplication of paper material would be very expensive.
- Enhanced information retrieval.
- Full text search
- Information can be shared with others more easily. By placing digital information on a server connected to the World Wide Web makes it available to everyone.
- Information can be updated continuously much more easily. It easier to keep the information current.
- Multiple access
- Nearly unlimited storage space at a much lower cost
- No physical boundary
- Preservation for some print material
- Protected information source
- Re-allocate funds from some staff, collection maintenance, and additional books.
- Reduces bureaucracy by providing access to the information
- Round the clock availability
- The information is not necessarily located in same place
- Understanding the catalogue structure is not necessary
- Universal accessibility
- User can access the information anywhere
- Wide exploration and exploitation of the information

5.2. Drawbacks of Digital Libraries:

Digital libraries, or at least their digital collections, unfortunately also have brought their own problems and challenges in areas such as:

- Copyright
- Costs are spread and many become hidden.
- Difficulty in knowing and locating everything that is available, and differentiating valuable from useless information.
- Digital preservation
- Equity of access
- Exorbitant cost of building/maintaining the terabytes of storage, servers, and redundancies necessary for a functional digital collection
- Inefficient or non-existent taxonomy practices (especially with historical material)
- Information organization
- Interface design
- Interoperability between systems and software
- Job loss for traditional publishers and librarians
- Lack of preservation of "best in class"
- Lack of preservation of a fixed copy (for the record and for duplicating scientific research)
- Lack of screening or validation
- Quality of metadata
- Training and development
- User authentication for access to collections

5.3. Issues & Challenges in Creating Digital Libraries-(Cleveland, 1998):

- Copyright/rights management
- Different forms of an object may be necessary for storage, delivery, display, and use
- Digital library concepts are obscured by technical jargon.

- Digital library technology exists within a legal and social framework.
- Digital preservation
- Digitization
- Equity of access - the digital divide.
- Information organization.
- Interface design.
- Interoperability between systems and software.
- Metadata
- Naming, identifiers, and persistence
- Persistent identifiers are a basic building block in the digital library.
- Preservation
- Repositories should preserve the information in digital objects-
- Software systems should be separated from digital library content.-
- Technical architectures
- The building of digital collections
- Training and development
- User authentication for access to collections.
- Users want access to intellectual works, not digital library technology and objects

6. Policy Perspective:

6.1. Legal Issues:

- Copyright protection
- Database security
- Equity
- Intellectual freedom

6.2. Technical Issues:

- Authentication, security
- Equity implementation
- OpenURL,
- Personalization
- Scaling
- Searching interfaces,
- Standards

6.3. Human & Organizational Issues-(Virkus, 2009).

- Access and content
- Inter-professional communication and collaboration (cultural barriers, mutual misperceptions, differences in priorities and visions);
- Issues of institutional infrastructure and politics (which include competition and territoriality, resistance to change, resistance to new technologies, reluctance of staff to engage in online learning, fear of change and evolving new roles);
- Resources and funding;
- Staff development;
- Teaching and learning (like different learning styles or information overload);

6.4. Learning & Library Resources Issues-(Akeroyd, 2005):

- Structured (published, quality material, standardized, bibliographic controlled, and peer reviewed).

- Less structured (course notes, handouts and the like which may vary from a lecture to lecture, is poorly structured and not subject to any bibliographic controls).
- Totally unstructured (which might emerge from discussion forums or e-mail lists and which is constantly changing and being amended).

6.5. Impact of Digital Information Materials on Libraries:

- Digital information can be cut and pasted from one document into another
- Digital information can be sent in multiple copies simultaneously over information networks in fractions of a minute or even of a second. There is no need for users with PCs attached to the network to physically go to the library. They can access information via their PCs.
- Digital information may be free or cheaper than print equivalents
- Digital information often modifies librarians' roles in various ways
- ICT has made the transfer of digital information from remote sites possible (Shift from Print to Digital Internet)
- ICT made information creation in digital format possible
- ICT made networking and sharing of information resources possible
- ICT made online access and file transfer possible

6.6. Evaluation of Digitization Work &Digital Library System:

- Access and distribution — open access versus campus-wide (closed) access;
- Collaboration pattern for collection building;
- Collaboration pattern for resources mobilization and utilization;
- Digitization workflow;
- Integration, cooperation with other resources and libraries
- Interpretation, representation and metadata;
- Selection of contents for digitization;
- User interfaces - search and retrieval

6.7. Reasons for Digital Library Collaboration:

- Costly new technologies.
- Financial benefit.
- Lack of funds.

7. Table.1. Traditional Libraries Vs Digital or Electronic Library:

Traditional Libraries	Digital or Electronic Library
Print collection	All resources in digital form.
Stable, with slow evolution	Dynamic and ephemeral
Individual objects not directly linked with each other.	Multi-media and fractal objects
Flat structure with minimal contextual metadata	Scaffolding of data structures and richer contextual metadata.
Scholarly content with validation process	More than scholarly content with various validation processes
Limited access points and centralized management	Unlimited access points, distributed collections and access control
The physical and logical organization correlated.	The physical and logical organization may be virtually
One way interactions	Dynamic real-time dialogue
Free and universal access.	Free as well as fee based.

7.1. Table.2. Traditional Library Activity Vs Web 2.0 World Vs Library 2.9 World:

Traditional Library Activity	Web 2.0 World	Library 2.0 World
Cataloguing	Automated metadata, del.icio.us	Metadata
Classification	Folksonomies and the semantic web	Locally provided and relevant folksonomy
Acquisitions	e-bay, PayPal, Amazon and Abe books	E-archives, e-data trust metrics and quality assurance
Reference	Yahoo Answers and Wikipedia	Branded links to trusted resources
Preservation	Digital Archives and repositories	Institutional repository
User instruction	Chatrooms	Moderated chatroom
Working space	Bedroom and Starbucks with a laptop	Wired campus and24-hour workspace
Collections	YouTube, Flickr, Institutional Repositories, Open Access	Aggregation of unique content with other libraries
Professional judgment	The wisdom of crowds	Teaching retrieval skills

8. Future of Digital Library:

As we venture into a more digital environment, many of the traditional measures of an excellent library have become eroded. We know that we have been successful and what benchmarks might we use to compare ourselves with peer institutions and against ourselves. In the digital world of information highway, there should be stress on three things: awareness of information, awareness of technology, awareness of needs. The awareness of information gives the breadth of vision; awareness of technology gives the power to make the visions manifest; and awareness of needs gives the insight to use professional skills and talents to the greater effect.

8.1. Customer Expectations in Libraries at Present:

The Expectations of Users vary from one environment to another environment, Institutional programs, priorities, vision, activities and specialization.
Based on the experience and exposure in the area of Libraries, it has been observed that the expectations of Users in Libraries generally are;

- Clear directions and way guides
- Continual improvement
- Continuous interaction
- Disaster Management
- Display and demonstration of information about staff
- Effective & Efficient workflow
- Electronic resources access and delivery
- Information literacy
- Proper communication facilities
- Proper documentation of facilities and services provided
- Quality initiatives and accuracy
- Speedier service delivery mechanism
- Web based initiatives and resources
- Well organized collections
- Well placed users complaints system
- Well-designed forms for availing services

9. Conclusion:

The Digital library plays an important role in promoting the use of information. Digital libraries give solutions to main challenges to traditional libraries such as storage. Libraries have always played a significant role in society, and digital libraries with the promise of breaking the barriers of geographical distance, language and culture, have a potentially even more significant social role. Digital libraries will not only change our reading and information use habits, they are also going to bring major changes in the economic models of information generation, distribution and management functions.

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