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DIGITAL ENVIRONMENT IN UNIVERSITY LIBRARIES: CHALLENGES AND OPPORTUNITIES

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Abstract: *The latest developments in Information and Communication Technology (ICT) have made the concept “Libraries without walls” into a practical reality. This has posed several challenges to the information work force and the information users. Developments in computers, microelectronics and communication technologies have dramatically changed the library and information environment. In this regard, the information environment is changing greatly throughout the world. Digital libraries are emerging as an important area of research and number of other related disciplines for information science in information age. The information technology has made a profound impact on availability and accessibility of e-resources. The concept of digital libraries and its objectives in university digital system and challenges has been discussed in digital libraries environment. This research paper is highlighted infrastructure and technology as challenges facing and parameters of digital environment. With the application of IT university libraries could gradually overcome such challenges and opportunities in consideration of users’ perspective. University librarians are facing difference challenges which have been focused in this study. It is also mentioned users’ expectation and requirements for digital environment in university libraries. The paper focuses its opportunities in digital environment in university libraries.*

Keywords: *Digital Environment, Challenges, Opportunities and Infrastructure, Accessibility.*

1. Introduction

Digital libraries are emerging as an important area of research and number of other related disciplines for information science in information age. The information technology has made a profound impact on availability and accessibility of e-resources. As we are approaching the new millennium, we can look back and last decade has been characterized by the development of the new information sources

known as digital libraries, libraries without walls or virtual libraries. The foundation of these new information sources is human knowledge organized according to some principle in form of digital collections. These digital collections can be later used in a local environment for various purposes (mostly for education) and eventually grow in size and combine into larger clusters of knowledge with other local collections thus creating global network of knowledge.

Furthermore, recent scientific works agree upon the fact that the future of the knowledge organization will be in form of highly organized structures of knowledge, based on indexed digital collections. On the local level such knowledge structures will share their resources by use of local area networks, while on the global level they will probably use the Internet which has already become a new paradigm for interconnectivity among various information sources in the world today. As it is self-evident, during the last few years, the explosive growth of the Internet has given immense contribution to the development of digital collections by giving opportunity to authors of such collections to communicate and share their experiences with their colleagues around the world thus creating another type of global network, network of experience and specific problem solving knowledge applicable to the creation of future knowledge structures.

2. Review of Related Literature

There is no sole explanation for digital libraries. The definition evolves as research progresses. Within the context of libraries, digital libraries may be viewed as technical services performed electronically with an entirely electronic application. The e-libraries are “a set of electronic resources and associated technical

capabilities” and that are designed to serve specific users community.

Li and Furht (2014) noted that the important aspects of a digital library that may be extended and enhanced include: The collection of the library, the organization and management of the collections, access to library items and the processing of the information contained in the items, the communication of information about the items.

Li and Furht (2014) stated that digital libraries are systems that combine the machinery of digital computing storage and communication, in which the content and software needed to reproduce, emulate and extend that services of collecting, cataloguing, finding and disseminating information offered by traditional libraries based on paper and other materials.

Trivedi (2010) defined that digital library as a library in which collections resources are stored in digital formats (as opposed to print, microform, or other media) and accessible by computers.

Fabunmi (2009) added more light that the virtual library can consist of materials from a variety of separate libraries which are organized in a virtual space using computers and computer networks. Virtual library is a collection of machine readable documents made available through an Internet site. The library does not exist in real life because physically it is not accessible but then it exists.

Fabunmi (2009) and Irokwe (2001) see e-library as synonymous to digital and virtual library. Both argued that a library having digital collections that could be accessed universally can be referred to as being virtual while a library with all holdings on CD-ROMs, DVD-ROMs, FMD-ROMs, etc. accessed from stand-alone computers would be electronic.

Mutula and Ojedokun (2008) noted that it is a library that contains no conventional print information resources, but electronic books, journals and newspapers. They further observed that the digital library may not occupy a physical space, where as users need to go and gain access to its electronic resources.

Aman and Norliyanan (2002) stated that an electronic library also refer to as digital library or digital repository focused on collection of digital objects that can include text, visual material, audio material, video material, stored as electronic media formats (as opposed to print, micro form, or other media), along with means for organizing, storing, and retrieving the files and media contained in the library collection,”

According to Daniel (2002), Nancy Schiller was one of the first writers to use the expression “virtual”. Schiller simply uses the term as “libraries in which computer and telecommunication technologies make access to a wide range of information resources possible.” All virtual libraries must, by virtue, be electronic, but not all electronic libraries are necessarily virtual. It is called ‘virtual’ because in a good electronic wide area networked library, the user enjoys the euphoria of being able to access collections in distant libraries, and yet he has not physically moved. It is an experience of virtual reality; the user does not need to be in a library environment.

Omolaye (2002) extended the definition to include access to electronic resources in the university library not only through the Internet but also other electronic/digital networks such as campus network or the intranet, without the physical need of the patron (staff/students) visiting the library.

According to Irokwe (2001), a digital library is a library that harnesses digital technologies as infrastructure to search, collect, organize, store and distribute cultural, historical and scientific information whether it is text, visual images or sound. This requires that all operations of the library are computerized. Such operations include selection and acquisition, cataloguing and classification etc.

Beagle (1999) explained that the information commons is a conceptual, physical and instructional space that involves an organizational realignment from print to the digital environment characterized by having Pervasive technology, group spaces, work stations and user services not just information services. And this shows that the e-library and information commons share the same nature and characteristics because both deal with

combination of both physical and virtual spaces. It is also important to note that it is the e-library that gives the opportunity to venture in the virtual space. The e-library contains the physical technologies that enable the virtual technology to perform. Also access to the virtual space is made real through the e library.

Digital libraries and virtual library are characterized by the following features as noted by Costabile and Semeraro (1998) access to information over a network, facilitate immediate and simultaneous access to information, they are interactive, i.e. support 2 ways communication with the users, they exist in multimedia format of text, video, graphics, sound and animation.

According to Sherwell (1997) are that there is no corresponding physical collection; documents are available in electronic format, not stored in any one location, and accessed from any station. It retrieves and delivers as and when required and effective search and browse facilities. Thus VL can simply be defined as a library without wall or as “a scientifically managed collection of information resources and services available electronically through the Internet at any moment”.

3. Objectives of the Study

- To contribute to the lifelong learning opportunities of all communities
- To promote the economical and efficient delivery of information to all parts of users
- To strengthen communication and collaboration among the research and communities.

4. Significance of the Study

Information and Communication Technology (ICT) has revolutionized the concept of libraries. In the digital era, each and every library is slowly getting digitized. Digital libraries offer such benefits as equitable access, reduced barriers of distance, timeliness, shared resources and content delivery. A digital library can be considered the following benefits.

- Encourage co-operative efforts in research resource, computing, and communication networks.
- Nearly unlimited storage space at a much lower cost.
- No physical boundary
- Enhanced information retrieval
- User-friendly interface
- Promote efficient delivery of information economically to all users
- Provide multiple access and access through campus
- Saving space which is required for publishing and bringing out new edition.

5. Methodology of the Study

The research study covers working environment in digital library perspective. In the digital era, digital environment needs to provide proper services to the right person at the right time. Researchers are working in university library and trying to develop digital environment with the application of IT. They focus their experience-based knowledge in this study. The study deals with secondary sources from various aspects and mentioned in the references list.

6. Discussion and Realization

6.1 Digital Environment in Libraries

The success of the digital library hinges on harnessing e-library as a means of providing effective service. To make this possible, there must be adequacy in terms of equipment and infrastructure.

6.1.1 Services Provided by Digital Libraries

Oni (2004) identified two major services provided in digital libraries environment.



Figure 1: Services in Digital Environment

CD-Rom Searching service: It is a very important tool in IT for e-libraries because of its

ability to store in high capacity, compactness and portability, reduce shelf space and durability.

Network Services: Network services provided by the library are: (i) Digital Electronic mail (ii) World Wide Web (iii) User net (iv) Telnet (v) File Transfer Protocol (vi) Remote Access (vii) Internet chat (viii) Internet feeds (ix) Relaxation and leisure (x) Video and Teleconferencing (xi) Live online help from librarians and (xii). Social Media: Blog and RSS.

6.2.1 Oakleaf M. (2010) identified four basic services provide added-value information services at the right time and at the right place of the right user.

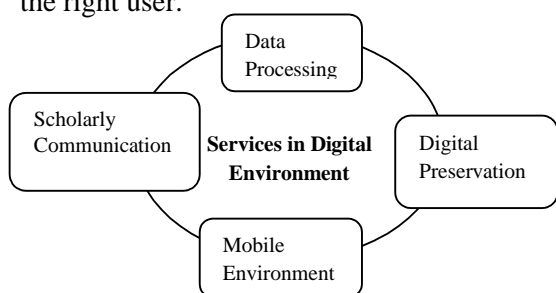


Figure 2: Services in Digital Environment

Data Processing: It is a process whereby digital research communities design and implement a plan for data description, efficient storage, management and reuse. Several discipline data repositories already exist and the digital library does the collaboration. Librarians in the digital environment collaborate with their research communities to facilitate this process.

Digital preservation: There is the need for their general long-term planning for the preservation. Only the digital library environment can establish architecture, policy or standard for creating, accessing and preserving digital content.

Mobile environment: Mobile devices are changing the way information is delivered and accessed. The digital library makes it possible to access and contact users via the mobile environment. An increasing number of library users depend on their smart phone for vital information utilization.

Scholarly communication: Through the digital libraries, new publishing models are being explored for journals, scholarly monographs, textbooks and digital materials as stakeholders try to establish sustainable models.

6.2 Challenges Faced by the Librarians in Digital Perspective

Dignity of the librarians’ profession in the university libraries cannot be under-estimated because this new trend has widened the scope of librarianship through new skill and effective services. Librarians also perform roles of computer and information scientist leading to high respect in librarianship and aims to achieving users’ satisfaction which the digital libraries provide by offering better efficient and effective services.

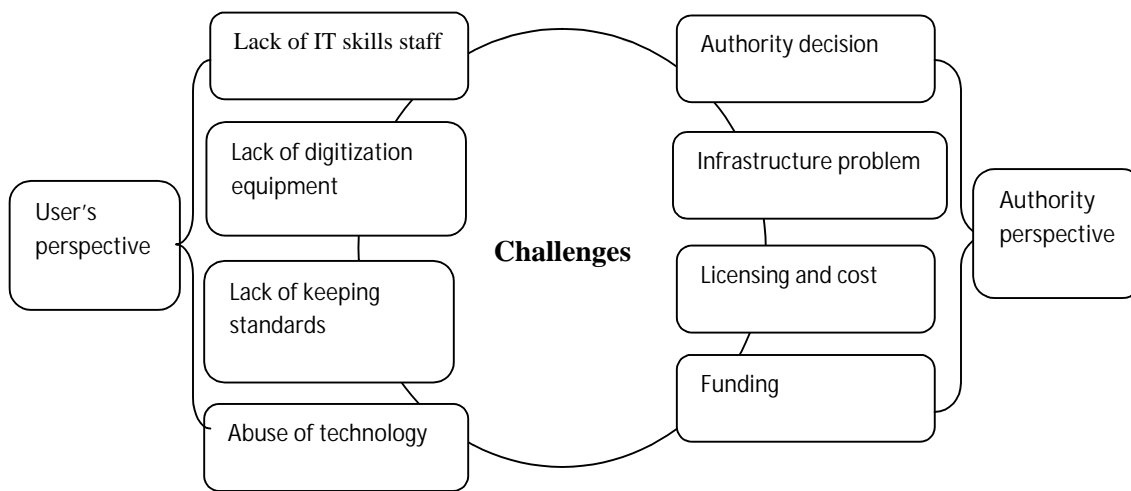


Figure 3: Challenges in digital libraries

6.2.1 User's perspective

Lack of IT skills staff: IT skilled library personnel need to appoint in consideration digital environment to provide proper services to the users.

Lack of digitization equipment: Libraries are facing funding problem, misunderstanding with higher authority to inform update technology.

Lack of keeping standards: Now a day's library personnel are not aware use of IT and implement any application in libraries. Need to keep update as well as realize the present situation.

Abuse of technology: Most of valuable time spent in abusing this technology by the users and information provider in the library. Technology can change library environment as well as develop library services.

6.2.2 Authority perspective

Authority decision: Authority can play important role to develop digital environment in consideration users' need of information in the digital era.

Infrastructure problem: Infrastructure is the main pillar to develop serene environment for the users. But most of the libraries are facing such problems in present situation.

Licensing and cost: At present digital era, software maintenance and cost are reluctance to implement it and need to appoint trained and skill person in the library.

Funding: Funding is the strongest support to develop library environment and authority can cooperate positively to keep update for the betterment of the users.

University libraries are challenged by the trends in the global digital society which is associated with use of ICT. The application of ICT facilities, slow faces in provision of virtual reference services. No define strategy of dissemination of information and access to users through electronic access cards and the range of problems associated to digitization in libraries as noted in the third world countries in which Bangladesh is no exception. The main challenges are mentioned in two ways i.e., users and perspective and authority perspective in the figure-3.

6.3 Parameters of Digital Environment

The digital library concept requires that librarians be information architects in order to build effective information service in the digital environment.

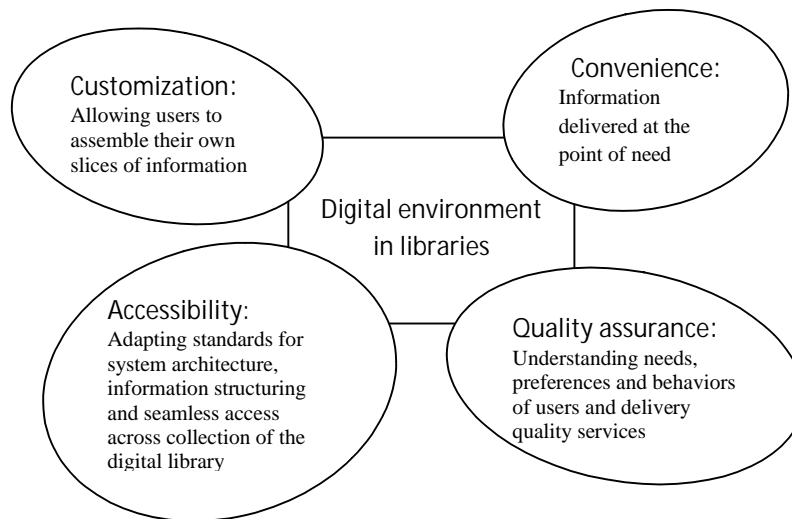


Figure 4: Parameters in digital environment

Parameters of a digital environment in university libraries are summarized in the following figure-4.

6.4 Users' Expectation in Digital Environment

Most of the academicians today have become Internet dependent. In the present electronic environment, user is highly impatient and time available tools and techniques so that flow and use of information is simple as well as effective. Digital information sources are themselves highly volatile; their content is changeable; their boundaries are unclear; they can simply disappear leaving no trace of their existence conscious, wants information 'just now or never'. So, libraries are forced to change from physical to virtual environment and make except a broken link from some other site on the Web. But in addition to the volatility of its individual components, the digital environment itself is the subject of rapid change. New technologies and formats come along and make older ones obsolete and unusable. The standards for creating, describing and preserving these information resources are still works in progress.

The information environment is also borderless. Most Web pages are not stand-alone publications. They form part of a chain of linked information resources that are stored on separate servers scattered around the Web. Digital resources resist the attempt to package them neatly within defined boundaries. In addition to their physical collections, libraries are now dealing with virtual collections composed of links to a plethora of external information resources.

Web has changed users' expectations for information delivery systems:

- Users want seamless access to information a single point on the web.
- They expect those searches to retrieve information regardless of its level of granularity.
- They want to discover non-textual resources such as images and data.
- Users want to be able personalized their information services on the web.

- Users want information to be available on demand without processing delays.

These expectations raise the bar for libraries. Libraries are operating in an environment of rapid change which demands the capability for rapid response. These increased expectations come at a time when most libraries are facing budgetary restraints.

6.5 Challenges in Digital Environment

Challenges must possible to overcome with the application of IT and by skill library professionals. Librarians need to realize the present situation and try to initiative to make serene environment for users to use the library resources. In constructing a digital library service environment, the library becomes responsible for configuring access to a world of information of which it manages only a part. In this digital era, digital libraries are facing at least three key challenges which are shown in figure-5 below

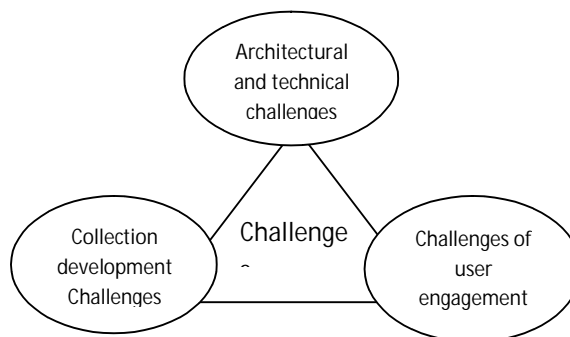


Figure 5: Key challenges in digital libraries

6.5.1 Architectural and technical challenges:

In developing a digital library service environment, the library seeks to enable meaningful navigation though and exploitation of distributed and heterogeneous information resources that are stored and managed in different formats and in different locations. At present, new generation resources are generally added to digital library service environments through improvised efforts to develop appropriate resource discovery, authentication, resource delivery, user support, or other services. To respond effectively to these challenges, libraries must seek a degree of consistency in the

information content they are integrating into their digital library service environments, and in the content to which the systems architectures that govern development, maintenance, and support of those environments can be generalized and extended.

6.5.2 Collection development challenges: In a networked space, libraries continue to extend the breadth and scale of the scholarly and cultural evidence they make accessible to their users. Paper-based and electronic materials such as electronic journals and reference databases remain important. Libraries have focused much attention on digitalizing selected special collections, and interesting collections have resulted. In this digital challenge, it needs to realize creatively about collection development strategies appropriate to the evolving digital library service environment.

6.5.3 Challenges of user engagement: In digital university libraries, academic and research communities are the producers of digital content, including research data, disseminations, e-prints, and computer-assisted teaching materials.

That content has enormous educational value, but only if it is assembled into professionally

managed collections, maintained over the longer term, and made accessible to other end users. It is insufficient for the digital library to maintain exquisite collections. At least in an online environment, the maintenance of such collection is itself an act of publication that will have far-reaching ramification for the nature of future research, learning, and cultural engagement. Other challenges in digital libraries are facing like as selecting source, formulating queries, examining results, searching techniques, bandwidth problem, protecting the intellectual property rights, preservation problems, and retrieving techniques. In digital environment, libraries are emerging as an organization that extends the breadth and scale of scholarly and cultural evidence and supports innovative research and life-long learning.

6.6 Infrastructure in Digital Library Environment

The main focus of the digital university library is to provide digital information service to the right information at the right time to the right users in the right format at the right place. Digital library’s environment depends on good infrastructure and author realizes it from his

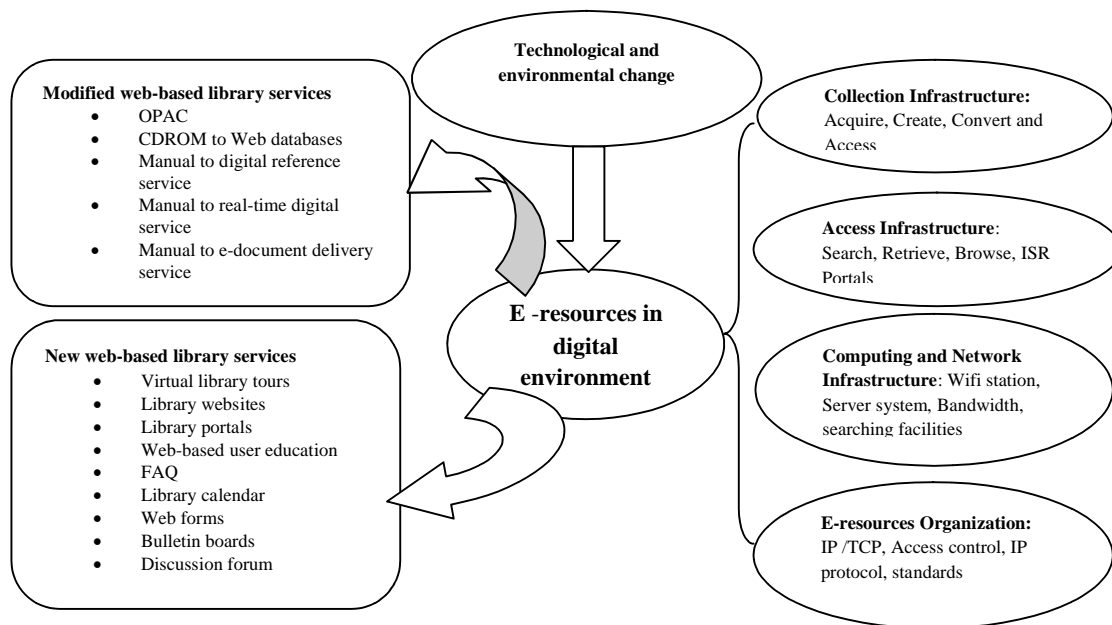


Figure 6: Conceptual-based infrastructure

long experience to work with the application of IT. Planning a digital library requires thoughtful analysis of the organization and its users, and an acknowledgment of the cost and the need for infrastructure and ongoing maintenance (Adams, Jansen, and Smith 1999). Libraries already have much of what is required for succeeding in the digital information environment.

Libraries need to establish criteria and practices that define collecting activities according to the requirements of the users. Infrastructure changes the libraries environment for data management and information exchange.

University authorities need to realize the importance of cooperative effort and invest in standards to support that infrastructure. This infrastructure can change the users' information requirements in digital environment. The main objective of digital infrastructure is to provide the right information to the right users in the right format.

6.7 Opportunities in Digital Environment

Space: Digital libraries have the potential to store much more information, simply because

digital information requires very little physical space to contain them. When the library had no space for extension digitalization is the only solution.

Cost: The cost of maintaining a digital library is much lower than that of a traditional library. A traditional library spends large sums of money paying for staff, book procures, rent, and additional activities. Digital libraries do away these fees.

Preservation: An exact copy of the original can be made any number of times without any degradation in quality.

Searching facilities: Users can easy to search their required resources from any anywhere any place due to broadband connection in digital environment.

Downloading: Users can also download their required resources with the help networking facilities.

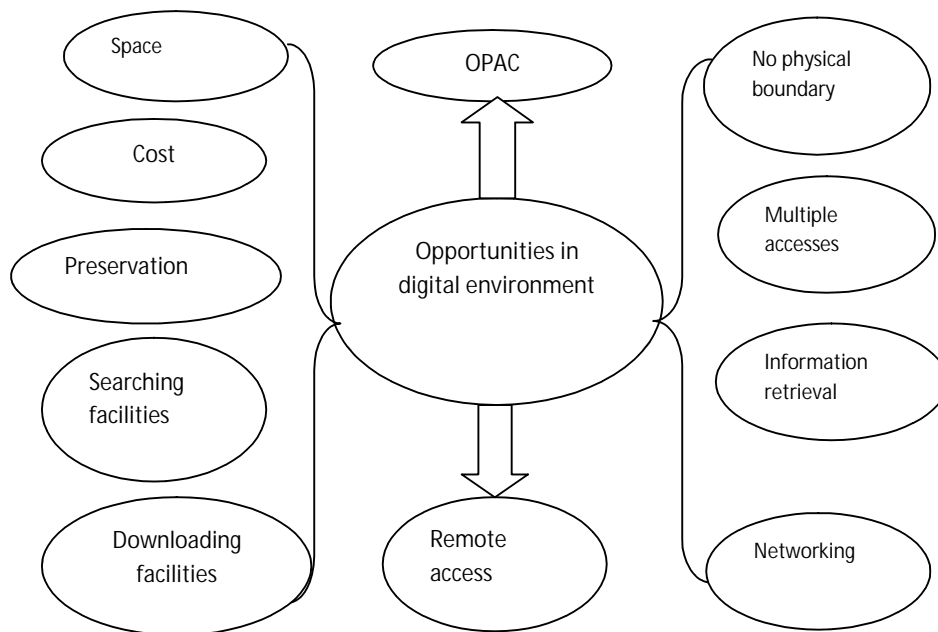


Figure 7: Opportunities in digital environment

No physical boundary: The users of digital library need not to go the library physically; they

can access the library databases from all over the world.

Multiple accesses: The same resources can be used at the same time by the number of users.

Information retrieval: digital library will provide very user friendly interfaces, giving click able access to its resources.

Networking: Resource sharing can be achieved by the users through networking in digital environment.

OPAC: It is very interesting facilities for all of users to access and meet the need of information.

Remote Access: Now it is also possible to access from the remote area by the users to get the same information, as long as an Internet connection available via MyAthens.

6.8 Requirements for Digital Environment in Libraries

The Internet and WWW provide the impetus and technological environment for the development and operation of a digital library. In the digital environment it is reasonable to observe that a central backup or archive must be created at the national level which will store information output of the region as well as information from outside the country.

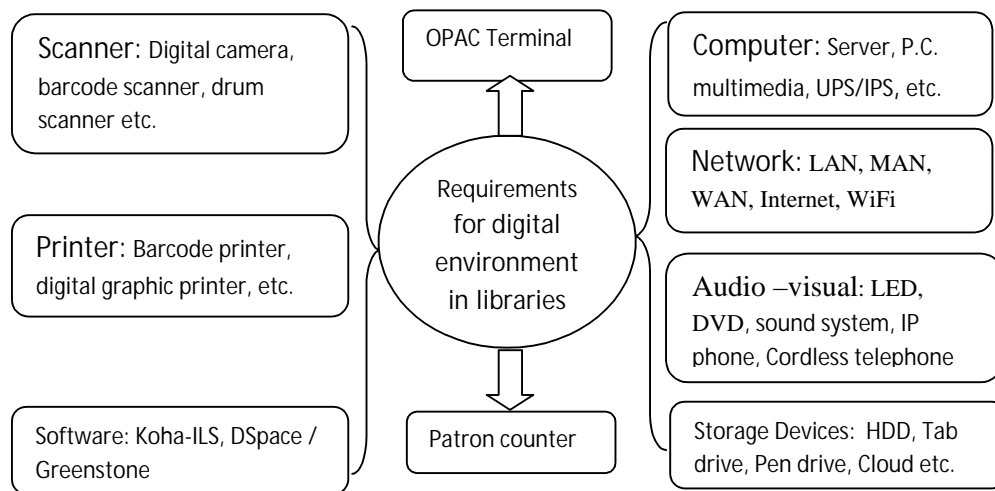


Figure 8: Requirements in digital environment

7. Conclusion

It is clear that digital libraries promise an exciting new service paradigm for the library community in the digital environment. Digital libraries are not going to replace the physical existence of document completely but no doubt to meet the present demand. The digital libraries today are providing service utilizing ICT facilities and infrastructures. Though they are faced with numerous challenges however, the university libraries could gradually overcome such challenges in the course of time. The most important, librarians should keep themselves abreast to the new technology and skills of the digital environment. In such situation and future trend, library professionals shall have to cope up with new emerging digital environment and

managing resources efficiently and effectively for their improved availability and accessibility ensuring convenient and comfortable use overcoming all the barriers through the digital environment in university libraries.

Recommendations

1. In consideration of digital era, IT skilled and trained person need to be appointed.
2. Authorities need to positively cooperate to develop library as well as organize training for updating technology.
3. Infrastructure need to be developed for making serene environment in consideration of the digital era.
4. Adequate fund need to be allocated for developing library environment as well as library resources.

5. Library personnel need to realize the exact expectation of users' need and try to collect update resources to provide proper services to the users.

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