
Technological and Legal Implications of New Generation of Libraries

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Abstract

This paper reveals the technological and legal aspects of designing a digital library on the route of new generation of libraries with automated approach. Technology of structuring and procedure of maintaining this generation of libraries require a detailed critical analysis of the issues involved therein. This communication endeavors to offer a blueprint of technological procedure for establishing a digital library with legal domain of copyright, and IPR issues on contemporary basis. It also routes the ongoing electronic information environment for libraries to an innovative, efficient technological way to provide user friendly well equipped digital library.

Keywords : Digital Library, Legal Issues, Technical Issues, Cyber Laws, Social Issues

0. Introduction

The recent development in information infrastructure has disclosed a wide spectrum of information repositories data network and information appliances. This is the age of information explosion. The existing concept of modern libraries confines itself to database. But in the rapidly changing scenario, access to electronic information sources is redefining its user domain from a group of specialized clients to a wide range of users including computer specialists, discipline experts, engineers, the general public, novice computer users and students at all levels.

Undoubtedly, the entire development of information infrastructure inducing the contemporary society to be an information society is in turn, poses various challenges to the existing library structure. These challenges route the existing libraries to address essential transformation issues including enhancing convenience and expediency, providing varying and overlapping information formats, extending operating hours and point of service, accountability of material, serving broader constituencies, managing cost of service and even testing the essential right to loan materials. All such requirements accelerate the pace of innovative efforts in order to develop a new generation of libraries, which can provide feasible and cost effective internet access, organize repositories of information, knowledge with advanced communication and information access services.

Digital library is such an innovative of inevitable concept, which defines the era of new generation of libraries.

The term "digital library" first came into the picture as the outcome of collaborative research initiatives founded by National Science Foundation, Advance Research Agency, and National Aeronautic and Space Administration in the United State.

1. Brief History of conceptualization of digital libraries

In 1945, *Vannervar Bush*¹ wrote about the "memex", which is often cited as stimulating much of the early application of computers to information retrieval. Licklider², in 1965, coined the phrase "library of the

future” to refer to his vision of a fully computer based library. Ten years later, F.W. Lancaster³ (1978) wrote of the soon-to come “paperless library”. Nelson⁴ (1974) invented and named hypertext and hyperspace similar to recently used terminology such as “electronic library”, “virtual library”, “library without walls” and “bionic library” etc. Karen Drabenstolt⁵ (1993) has produced an excellent analytical survey of this and related literature.

2. Terminology and visualization of digital libraries

Clear understandings of term digital libraries would help to enhance the vision of architecturing a road map of new generation libraries. It also envisages the scope to set the goals and deliberate on issues related to data mining and IPR.

The Meaning of the term “digital library” is less transparent than one might expect. The words conjure up images of cutting-edge computer and information science research. The new generation of libraries offers the integrated approach of “electronic⁶” and “virtual⁷” libraries.

Digital libraries are organizations that provide the resources including the specialized staff, to select the structure which offer intellectual access to interpret, distribute, preserve the integrity 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 the set of communities.

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 a computer networks.

In view of stated terms we visualize the road map of digital libraries incorporating the followings:

- Information appliances and services that can provide access in a scalable, efficient and interoperable way.
- Information access techniques that can enable efficient search of large distributed information repositories, making the myriad of information resources understandable.
- Multimedia information technologies that can, for example, synchronize and integrate real-time delivery of voice and video, and can support content based search and retrieval.
- Economic models, pricing policies and intellectual property right management.

In addition, library technologies must provide dependability, manageability, ease of use, interoperability, security and privacy.

At the same time new generation of libraries / digital libraries are expected to represent the primary information and knowledge repositories of the information infrastructure. Their importance from the educational, social and economic point of view is clearly evident constituting the core of information infrastructures.

New generation libraries completely equipped with digital environment is a very important application area. In particular, from the technological point of view, this digital system contributes greatly to the development of the critical information management⁸ for the information structure. Donald J. Waters added broad areas to this vision.

3. Policies and issues in context of new generation of libraries

3.1 Policies and Social issues

Libraries of today and tomorrow have to accommodate a variety of “new media” both to satisfy users’ needs and to automate their various “house keeping” procedures. For the vision of libraries to become a reality, there is an immediate need by the policy makers and key personnel in the areas of IT to address the following policy related issues:

- Universal service and access, which includes the mechanism by which each library would be guaranteed, as access to and use of networking tools. Universal service policies for libraries will have to be evolved to provide telecommunication facilities at affordable rates.
- Intellectual property issues, including copyright and the “moral rights” of artists and authors to their works, which may support or inhibit the library’s role as holder and lender and may in some scenarios even affect the ability of library patrons to browse material freely in digital formats.
- Funding or support mechanism, for library services, acquisition and operating expenses.
- Key government initiatives for libraries apart from framing the various policies that can help penetration of IT in libraries. Government can initiate few projects under their Electronic Governance Programs for the libraries which will ensure common hardware and software products for the libraries thereby facilitating inter-library transactions and single window interface to libraries by the public.
- Efforts to evolve meta-data standard for cross-domain resource discovery can be initiated.

The INFLIBNET Center, Ahmedabad is working on the same concepts to bring all universities and colleges libraries of India through a Centralized Networking.

All these policy issues should be considered and their implementation is required because library is a highly significant organization, which will continue to play important social, cultural, technical and pedagogic roles in the future.

3.2 IPR issues

After looking at all social & policy issues, IPR is the key issue; without considering this the visualization of new generation library is in half way.

The new generation of libraries focus the prime issues of democratizing information, empowering the masses and allowing end-user access to a vast array of resource. Recent advances in technology have produced radical shifts in the ability to reproduce, distribute, control and publish information. The World Wide Web (WWW) has allowed everyone to be a publisher with worldwide reach. At this crucial scenario, in order to protect the right of authors, developers and to provide privacy and liberty to user, it becomes essential to introduce laws against computer crime and help to build IT infrastructure. In view of these facts, various laws, Electronic-fund Transfer, Electronic Cash and digital intellectual property rights etc., have been enacted. Recently various amendments are also proposed in Indian penal Code, the Evidence Act, 1872, the Banker’s Book Evidence Act, 1891, Indian Patent Act and General Clauses Act to keep interest of Information producer, Infrastructure developers, Service provider and Free and equal access to user end.

Out of these mentioned interests, the first one deals with the copyright issues and information producer while others deal with and information technology and cyber laws.

3.2.1 Copyright Issues

In case of library, primary contents provider⁹ is author or publisher. To save the economic interest of the author or publisher and the promotion of learning in India, the Copyright Act (1957) was enacted by the parliament in India. The earliest copyright convention is the Berne Convention of 1886, which is revised periodically. Recent international treatise, which was promulgated by WIPO¹⁰, and the Copyright Treaty, 1996 dealt with right of primary content providers such as author, artist in the digital environment. This treaty has formulated some restricted acts in the interest of contents providers are as follows:

- a. to copy the work, which means to reproduce it in any material form¹¹ which includes storing the work in any medium by electronic means;
- b. to issue copies to the public;¹²
- c. to perform or play the work in public¹³;
- d. to broadcast the work on radio or television or to include it in a cable programme service¹⁴;
- e. to make an adaptation of the work¹⁵. This applies only to literary, dramatic or musical works which can further be defined as follows:
 - a translation of the work;
 - in the case of a dramatic work, a version of the work which is converted into a non-dramatic work;
 - in the case of a non-dramatic work, a version of the work which is converted into a dramatic work;
 - a version of the work in which the story or action is conveyed wholly or mainly by means of pictures in a form suitable for reproduction in a book, magazine or in a newspaper or similar periodical. The adaptation itself will gain its own copyright if sufficiently original;
 - to rent or lend copies of the work to the public¹⁶.

The above stated acts could be helpful to have an effective and efficient right management system, which in turn enable the copyright owner:

- a. to identify his work, say through digital signaturing;
- b. to make available his repertoire of works to as many potential users as possible;
- c. to be reasonably certain that his rights are protected both legally and through technical encryption;
- d. to be adequately rewarded via this system for each use of his rights within a wholly digital environment;
- e. to be assured fair dealing. Any fair dealing provisions must be fair to the copyright owner given the massive potential for misuse in a digital environment which might render the whole notion of fair dealing inappropriate.

Rights have been mentioned up till now, there are however, statutory limitations to these rights. In context of library professionals, "Paper Copyright and Consortia" by S. Amba (Central Leather Research Institute), brought out the proposals which are:

1. Single copy for private, personal and non-commercial purpose, research and study.
2. Aid in teaching.
3. For use as a quotation
4. Use in a criticism or Review.
5. As a part of Judicial Proceedings.

It is important to point out the extent to which digital communication technology should be exploited for information access, retrieval and disseminations. The care with which materials can be downloaded, copied, transmitted have all had their effect on copyright laws.

3.2.2 IT Act and cyber laws

The Information Technology Act, 2000 provides the transaction carried out by means of electronic data interchange and other means of electronic communication, commonly referred to as “electronic commerce”.

The United Nation on International Trade Law (UNICITRAL) adopted the Model Law Of Electronic Commerce in 1996. The General Assembly of the United Nation by its Resolution No. 51/162, dated 30th January 1997, recommended that all States while enacting or revising their respective laws should give favorable considerations to the said Model Law. The Model Law provides for equal legal treatment of users of electronic communication and paper based communication. Thus, there is a pressing need to amend the existing laws, to facilitate legal recognition of electronic records¹⁷, digital signature¹⁸, piracy of e-record.

The Indian Parliament, 2000 accordingly enacted the Information Technology Act. It came into force w.e.f. 17/10/2002, with the notification No. GSR 788 (E).

Though some more areas have to be incorporated, in some areas amendment is also required.

Chapter II¹⁹: This Act specifically stipulates that any subscriber may authenticate an electronic record by affixing his digital signature .It further states that any person can verify by electronic record by use of public key subscriber. This chapter provides for authentication²⁰ and authorization²¹ through digital signature to solve the problem of access control and security to some extent.

Chapter III²²: This chapter deals with Electronic Governance for legal recognition of Electronic records. Where any law provides that information or any other matter shall be in writing or in the typewritten or printed form, then notwithstanding anything contained in such law, such requirement shall be deemed to have been satisfied if such information or matter is:

- a. rendered or made available in an electronic form;
- b. Accessible so as to be usable for subsequent reference

The above mentioned act protects author’s interest as well as provides free and equal access to the user with liberty and privacy.

Chapters IV to XII²³ : These chapters deal with Governance for implementation, control, protection and compensation in case of infringement.

Keeping in view the above stated act, we conclude that effort has been started to protect intellectual endeavor and financial investment. There is a need to incorporate some new laws and amendment in order to make system more liable and speedy.

Along with all these laws below mentioned technological controls would also help to keep the interest of content providers.

Security measure In this authentic area of digital watermarking and access control, this type of security method is to be looked upon.

We can summarise that public access to published information is the corner stone for academic activities and the philosophy which, guides education institutions and libraries. This philosophy leads the policies, issues of which persuade towards key issues as it preserves the integrity and ensure the persistence, collection of digital works, "Readily and economically available" and used by a defined community or set of communities.

4. Model and Framework of change management in accordance with user requirement and satisfaction

4.1 Choosing a collection: Access Versus Preservation

What should be collected and which medium should be used for storage is based on two principle criteria. They are:

1. Public demand for access to intellectual or visual content.
2. Preservation needs of the physical objects.

Collection should be based on public and scholarly demand for content. This collection should be catalogued and indexed in exportable to ASCII delaminated or MARC formats, which makes imaging data born construction much easier.

4.2 Infrastructure designing and implementation for storage transmitting and accessing

New generation library is a logical extension of the network end, the development triggered thereof, and provides the users with coherent access to organize repository of information and knowledge. Designing and implementation of the concept of data mining²⁴ is most applicable for data storage and retrieval system in the context of new generation libraries.

One of the first design issues in the creation of a digital library is to prepare blueprint of infrastructure and transmission procedure. This includes what information will be collected, how the information will be generated, who is the user community, and how the data will be accessed.

4.2.1 Database creation and storage

The Dublin Core²⁵ provides a common set of labels for information to be exchanged between data and service provider. This data is created with the help of DBMS/RDBMS Software. Database is to be created on the basis of merging standard of metadata tags for journal, books and other documents with a set of 15 elements that can be associated with a resource title, creator, subject, description, publisher, contributor, date, type, format, identifies, source, language, relation, coverage and rights. Each of the 15 elements is defined using ten attributes specified in ISO/IEC 11179, a standard description of data elements. The files can be uploaded with the help of FTP (File Transfer Protocol)²⁶. HTTP opened the world to information sharing at a new level by allowing any WWW²⁷ browser to communicate with any information server and to request and obtain information.

4.2.2 Transmission and accessing

User interfaces or accessing information can be made easier by the ubiquitous nature of hyper linked World Wide Web that gives de facto standard in user. Emerging standard, such as XSLT to the information language is used to separate the logic and workflow of the system from the user interface.

Some collection of digital objects requires interfaces that are specified to the object domain and nature of the data. Multifaceted data can be visualized using two and three dimensional discovery interfaces where different facts are mapped to dimensions of the user interface, Virtual reality devices can be used to add a third dimension to the visualization. In addition to representing data, collaborative workspaces in virtual world can support shared discovery of information in complex spaces. In order to locate audio data such as music, it is sometimes desirable to search by specifying the time rather than its metadata. Hu and Danneberg provide an overview of techniques in involving in such queries.

In case of digitalized books where full text search is required, there should be a separate file of different books that could be stored in HTML format. This particular file would be available through different searches as author, title etc. using ASP as a mediator. Entire mechanism is exhibited in the following figure:



Complete blueprint of third generation libraries as presented in the figure basically emphasizes on two concepts. First is the digitalized storage, which is focused to quality and organization of document and second is web technology packaged, to suit particular sets of users desiring specialized content and services.

4.2.3 Expediate and pinpointed retrieval system keeping the view to protect the interest of author developer

In this age of information technology, library has to play the role of mediator between commercial library service providers e.g. net book library (which provided the books in digitalize form in negotiation with renowned publisher as Oxford University Press, Cambridge University Press, websites as for law lexisnexis.com, westlaw.com) and users. In this context, librarian has to play intermediary role to protect the interest of copyright holder. In order to develop the system, which provides personalization and privacy at user end and security at service provider end, authentication and authorization process is the best solution.

In order to develop this retrieval system, following procedure can be adopted:

Install the web server and upload the files. This way user ID under which web server runs can be set. We have to set our server to run as the user account under which we are developing our site. When a user browsing the web tries to access a webpage in area, a user login and password box appears. The following figure exhibits this procedure:

Only a correct login and password allow the user to access that section of the website. This type of system allow to know user preferences and to tailor services to special need or simple choices. Personalization depends on user information, generally in the form of user profile and history of prior use. In addition to making it possible for the library to provide services, the identification of a user allow evaluation of how well the library is serving that user. If a given user returns frequently, it provides user available services, keeps a supply of materials available for later user, and participates in user options such as annotation and discussion, it is reasonable to assume that user is well served. Thus, an analysis of user characteristics and activities can help to determine if the library is serving its intended audience adequately.

In view of authentication process, copyright could be protected using some advanced security technology such as user domain controlled user access, encryption, watermarking, usage limitation and automatic return of borrowed materials.

5. Consortia: Success and reality, free and equal access to digital libraries

In the global movement towards electronic and digital libraries; the major problems faced by developing countries are poor infrastructure and economic resources. To resolve this problem, establishment and maintenance of digital libraries needs preferred practice for library consortia and their member libraries to achieve desired electronic information environment. The efforts has already been started in different areas such as International Coalition of library consortia (ICOLC), TRIPS, WIPO on copyright and IPR issues Digital Library Technical Committee on technical issues by NASA, ARPA and NSF working together, etc. These consortia would be helpful in the principal motivation of establishing digital libraries comes from resource sharing, which will not only increase access to information but eliminate much of the redundancy collections.

Though these consortia started working on different issues but to give the shape to our vision to know ground realities are unavoidable.

Some emerging issues and problems which has to be resolved are as follows:

5.1 Economic problems

The principle of resource sharing can solve economic problem at some extent. For this, academic libraries and information providers must use information technologies to facilitate speedy and efficient information delivery and make e-information more generally, readily and flexibly accessible than its printing counterpart.

5.2 Legal problems

Copyright may be a barrier to digital library development, because the digitized library has raised new problems for copyright obligations, relating to the unauthorized republication in a new form. A digital library should balance intellectual property with public interest, with using security measures as watermarking, access control. On one hand, the public characteristic of libraries derives from a non-market or non-profit principle of free and equal access to information and knowledge, therefore the advent of digital libraries shouldn't change that basic function. On the other hand, universal access to the digital library is a precondition for the development of a digital market with free public access to information in a digital library is made compatible with market mechanism for the distribution of information in an economy where information is commodity.

By keeping up-to-date with the latest technologies and standards, a new generation library of high expectation for multi users can be created.

6. Conclusion

The Road Map of New Generation of libraries can bring revolutionary changes in contemporary information infrastructure. Technology has enabled diverse distributed collection of contents to become integrated at the metadata and/or content levels, for widespread use through powerful interfaces that will become increasingly personalized. This communication provides true intellectual information access in the form of indexing, cataloguing and classification. Standards, advanced technology, and powerful systems can support a wide variety of types of users, providing a broad range of tailored services. The new generation of libraries glorifies the information access services and optimizes the infrastructure with user's requirement. A blueprint of technology for establishing such a library embedded with social and legal issues including IPR policy is the theme of this paper. Along with this, many challenges are still to be resolved such as integration with traditional library collection, handling the needs for multilingual access, and long term preservation.

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6. Electronic: Electronic material can include all digital materials, as well as a variety of analog formats that require electricity for use.
7. Virtual: Exist only virtually does not exist in real life. A virtual library can consist of material from a variety of separate libraries that are organized in virtual space using computers and computer networks.
8. Information Management: Computerized method that assist in the locating, accessing control and payment of digital documents.
9. Primary Content Provider: Those who produce:
Original ideas and original literary works, including novels, poems, plays
Information, text, compilation and data
Artistic work such as drawing, paintings, designs, graphics, photographs, maps, charts, plans;
10. WIPO: World Intellectual Property Organization.
11. Copyright Designs and Patents Act 1988, s.17.
12. *ibid.*, s. 18.
13. *ibid.*, s. 19.
14. *ibid.*, s. 20.
15. *ibid.*, s. 21(3)(b).
16. section 18(A)(1).
17. Electronic Record: Means data, record or data generated, image or sound stored, received or sent in electronic form or microfilm or computer generated micro fiche.
18. Digital Signature: Means authentication of any electronic record by a subscriber by means of an electronic method or procedure in accordance with the provisions of section 3 of 4 the Information Technology Act, 2000.

19. The Information Technology Act 2000, s.3
20. Authentication: In computer terms, authentication is the process whereby a person is validated as who he says he is. User name and passwords are vehicles for computerized authentication.
21. Authorization: Is a process of allowing or denying computing services based on characteristics of the authenticated individuals.
22. The Information Technology Act 2000, s.4,5
23. The Information Technology Act 2000.
24. Data Mining: is to extract valuable information from your data, to discover the "hidden gold".
25. Dublin Core: The Dublin Core is a 15-element metadata element set intended to facilitate discovery of electronic resources.
26. File Transfer Protocol: The standard TCP/IP protocol for transferring files over the Internet, across any platform.
27. WWW: Also called the Web, World Wide Web, W3, an interlinked collection of hypertext documents (Web pages) residing on Web servers and other documents, menus, and databases, available via URLs (uniform resource locators).

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