Chapter - V

Integrated University Library and Information System - Model

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“All successful people men and women are big dreamers. They imagine what their future could be, ideal in every respect, and they work every day toward their distant vision, that goal or purpose.

- Brian Tracy
5.1 Introduction

The central role of a university library is to promote and facilitate effective use of recorded information in different forms and format by its clientele. The important goal of the library is to give all citizens easy access to information regardless of format, and location of where the information is stored. A network is an essential partner in this exercise because it facilitates access to vast information services. Networks have potential role to improve library services in several ways. Information networks have changed from traditional library system to virtual system of World Wide Web sites, a document delivery unit, telephone, E-mail, reference and desktop technical support. The information network must educate its customers who were accustomed to the library as a physical place to check out books, talk to reference librarians and browse journals through information networks. Customers receive services without going to a fixed place. For many years the library services assumed the responsibility of searching and supplying information in response to specific requests. The information network must ensure that information can be found or delivered quickly, from a large universe. The computer workstations in the libraries are now well equipped for dial-up and Internet access etc.

The libraries and library user gets benefited from accessing databases, participating in discussion forums, access to other Internet resources. Constant improvements in the networking technology will reduce the cost of
information provision, thus creating new opportunities for academic institutions in the research and development. The academic world is looking at the university libraries for a total solution or one stop shopping for their requirements. The concept of one system, one library will provide users - students, faculty, staff and citizens - with access to not only university library collection but also global access to electronic information resources thus providing the integrated university library and information system. (Wisconsin, 2001)

5.2 Strategic Directions, Goals and Actions for an Integrated University Library and Information System

Implementation of the concept of one system one library requires strategic directions, goals and actions. Following functions are studied for providing the integrated access to university library and information system. (Wisconsin, 2001);

1. The library collection has to be developed as an integrated, interdependent resource for university research and teaching with a concept of ‘one system, one library’ by;

   a. Developing a nationwide resource sharing which provides open access and common library policies across campuses to serve the user community
b. Allocating funding to enhance resource sharing and delivery of services that will provide the users timely and unrestricted access to all library collections.

c. Providing convenient access to a shared collection and materials and electronic resources including full text journals, reference resources, and government information etc. Such resources depend upon strong local collections and will increasingly include digitized materials from the libraries existing collections.

d. Promoting cooperative collection development, nationwide licensing of electronic information and coordinated policies to control costs and with respect to copyright and the intellectual property created by faculty and students.

e. Inform and associate faculty, administrators, publishers to develop viable models of scholarly communication that are equitable and affordable.

2. The university library and information system will provide timely access to the high quality, shared book, periodical and multimedia information resources of the participating libraries and gateways to digital information resources. This can be achieved by:
a. Continue to upgrade and enhance the common library management system to support strategic library goals with respect to resource sharing, integrated information access, and controlling costs.

b. Provide the users with variety of research and searching tools to allow online catalog or web access to the digital information resources including multimedia resources.

c. Implement library technologies that will provide users with remote access to course materials via electronic reserve reading services and other electronic learning technologies.

d. Provide complete online access to the cataloging records of all library collections as well as enhanced access to some specialized collections.

e. Support online learning, online degree or certificate programs with appropriate identification, authorization and authentication.

3. Librarians will serve as information resource managers and teachers who assist their clients with using new learning system and information technologies.

The librarian plays various roles in various contexts. The librarians have been spurred by technological developments to become more
efficient organizers, cataloguers, indexers, abstractors, archivers etc. In addition they have now challenging role to play their new roles such as Intermediary, educators, facilitator, information manager, custodian of information, provider of information or publisher, knowledge manager etc.

4. The university libraries will collaboratively implement staff development programs that anticipate the changing information resource needs of students and faculty. To achieve this:

a. Examine to collaborate on staff development initiatives to share expertise and reduce costs.

b. Encourage innovation and experimentation in developing new services to meet the changing information resource needs of students and faculty.

c. Encourage critical examination of current practices to most effectively use staff resources, which may lead to opportunities to discontinue unnecessary processes or outsource operations.

d. Focus on future, explore ways to diversify staff by establishing cooperative programs.

e. Participate in the development of new academic library leaders in the state.
5. The university library and information system will serve as the Centre of knowledge and information for their campuses by providing physical facilities and IT infrastructure to promote teaching and learning and meet access requirements for all students, faculty and staff. This can be achieved through:

a. Work with campus IT to ensure network capacity, hardware and software to support information retrieval.
b. Assure that the requirements are accommodated in terms of hardware, software and information resources.
c. Provide workstations and web pages, which implement standards required for access by users.

6. The university libraries will become more accessible to the university alumni, citizens, other universities etc and will seek mutually beneficial collaboration to promote educational and economic goals. To do this:

a. Look for joint projects, grants, and cost saving opportunities, and occasions to share expertise.
b. Work to develop expanded access to library resources as well as access to other library resources.
c. Explore with alumni offices, opportunities to expand library resources available to alumni.
7. The university libraries will seek to develop funding resources for infrastructure development, cost towards electronic access to resources, digital library projects etc. To do this:

   a. Explore the possibilities of funding from the state governments and central government funding.

   b. Working with university system administrators to assess the need for funding towards different activities.

These goals can be met by initiating the following actions:

1. Apply resource sharing policy recommendations to universal borrowing implementation.

2. Explore the software options to enhance the resource sharing across the libraries for rapid journal’s article delivery capabilities.

3. Implement goals for digitization of rare collection of the library.

4. Expand number of shared databases within the available budgets.

5. Continue to experiment with and develop collection of electronic books.

6. Investigate the role of libraries as repositories for digital learning sources.

7. Identify the methods and procedures for providing access to course materials for online education and make sure the material created are based on standards.

8. Undertake / participate in cooperative journal collection development.
9. Develop mechanism for sharing decisions on periodicals, de-selection and other collection management decisions.

10. Conduct review of cooperative collection development policies.

11. Inform the university administration and faculty about the benefits of reducing the cost of information.

12. Investigate / Develop the software that allows searching across multiple electronic resources.

13. Pool resources to provide access to electronic reserves across all libraries.

14. Identify and develop mechanisms for funding sources, resource sharing etc which will adequately serve students and faculty.

15. Support remote access to licensed electronic resources.

5.3 Need for an Integrated System

The need for establishing an integrated university library and information system is viewed in terms of the following points;

1. Establishment of Integrated system facilitates the enhancement of existing library facilities and also increase accessibility to all other citizens to library resources and services.

2. Can provide training to the library staff who does not currently possess the skills in the use of new information technologies by organizing well-designed training programs with mechanisms for follow-up technical assistance and support.
3. Promote collaboration and cooperation among libraries for sharing of holdings and technical ability to maximize scarce resources. Limited holdings, financial capacity, and human resources are major barriers to improving library services.

4. Develop recommended standards and guidelines for library services.

5. Increase access to electronic information sources.

6. The cooperative activities are centralized, and they obtain remarkable results in training, the improvement of library Inter-lending, and in publishing a CD-ROM of bibliographical records from participant libraries for effective use.

7. Cooperation is a way to accelerate the evolution of libraries, and to create new services, to facilitate changes, and to save expenses. The library networks are developed to connect libraries, which ensure the development of union catalogue with locations.

8. In the era of the Internet, electronic documents, and the virtual library, maintaining independent libraries is out of order. In addition, the efforts needed to face the challenges of the information society and the changes that society is demanding of universities are destined to become weaknesses more than strengths in those institutions that face them individually. There are many reasons why it is advisable for libraries to approach these challenges collaboratively.

9. The huge technological opportunities to share information.
10. The high cost of the e-journals.


12. The ultimate goal of cooperation is to join users and the documents with the information they need.

13. Consortia represent the possibility to test alternatives to the traditional automated library. They represent the potential to offer the best library services to a wider number of users with all the resources they possess.

14. The successful operation of a library consortium clearly depends on good working relationships among members and between members and the consortium.

15. One of the significant challenges facing academic libraries during times of dynamic change is the ability to understand the needs and perspectives of their users.

Following the automation initiatives, the network technologies and data transmission development, most university libraries have made projects for all information resources integration and maintain a wide group of services viz. Campus wide networks, catalogs, databases in CDROM, e-mail, and remote access via Internet. Access to all resources is available through the libraries management system through its web OPAC. There is an access to these resources from any point connected to the network.
5.4 Components of Integrated university library and information system

5.4.1 Information resource sharing

The voluminous growth of literature published in almost all areas, the increasing cost of information resources and developments in the technological tools, offer new methods of information storage, processing, retrieval and dissemination. The process makes the sharing of resources a necessity. The library cooperation is an old concept and a form of resource sharing. (Kaul, 1999). Need of resource sharing was realized by libraries long back through cooperative acquisition, cooperative cataloguing, cooperative classification etc. Inter library loans has been practiced by the libraries as one of the most popular resource sharing activity. The limitations such as apathy of the lending library, distance, language, time etc are resolved to a certain extent with the use of computerized inter-library loan systems.

For resource sharing the participating libraries must come together and cooperate mainly for collection development and providing effective services. Developing shared resources (Dhawan, 1999) is of great importance and central to the concept of resource sharing. For developing the shared resources, the focus should be on first to eliminate duplication in the acquisition of costly contents to the extent possible. Secondly focus on the selection of agreed set of publications can benefit large population.
Resource Sharing and Networking models

It has been evident that, for the last two decades libraries have witnessed the impact of information technology, which is effecting the structure of the services of the university libraries to a great extent with the expectations of users growing. The libraries have also been challenged by the problems of space, standardisation, professional development of the staff, challenges posed by the new technologies, drastic cuts in the library budgets, devaluation of Indian Rupees and its impact on the library acquisitions can best overcome upon by the use of computer and communication networks for resource sharing. The use of national and international databases through communication networks and introduction of access to full text resources through cooperative acquisition programmes are the major issues (Kaul, 2001).

The resource sharing networks have various levels such as local, regional, national and international. In local level the information is stored in the local libraries in the form of union catalogue. Similarly the regional level includes the information stored in regional libraries and services provided. In national level programme the union catalogue is prepared on the national basis and services are provided to users based on national resources.
5.4.3 Resource sharing in developed and developing countries

Library networks have grown mostly during the last thirty years in different geographical environment in order to cater to the specific needs of the users. In the United States there has been a proliferation of them. Library networks in other countries are also growing. Several models have emerged that provide specific services. Not all networks conform to the essential functions of library networks. However, the essential functions should include the promotion of Resource Sharing, creation of resource sharing tools like Union Catalogues, rationalisation of acquisition and maintenance of International standards for creation of records uniformly. Libraries should be able to join different types of networks depending upon the need and select a model, which conforms to its requirements. (Kaul, 1999)

In the developed countries resource-sharing networking was started long back. For instance the growth of networks in the United States can be traced from mid of 1960. USA is the birthplace of library networking and by now libraries in each state is networked to local, regional and national network. It is important to note that the US Department of Education has been advocating a vigorous policy of promoting library networking. It offers networking grants, supports inter-library loan projects, automation and retro-conversion projects, resource sharing schemes, etc. besides providing regular federal grants annually to the public and academic libraries. Resource Sharing works in UK is also well established. The best example is Birmingham Library Co-
operative Maintenance. Project (BLCMP) in Birmingham, has 13 million bibliographic records of books, serials, music etc. in its database and its catalogues get a hit rate of above 90 per cent with more than 60 libraries comprising public libraries, college libraries, university libraries, national and special libraries. BLCMP has introduced EDI clearing house service in about 25 libraries. In Australia the resource sharing tools have grown from catalogue cards to national databases with the contributions of many older and larger libraries. In Australian Bibliographical Network, the national and central bibliographic databases are maintained and coordinated and maintained by a national agency. The Swedish Model for resource sharing is called the Consortium Model. This model is developed only for six major science and technology libraries in Sweden.

The developing countries like India are lagging behind in library co-operation. The reasons for the same are poor funding and the non-existence of the spirit of give and take or exchange is delaying the prospects of resource sharing programmes. The practice of resource sharing in the Republic of China (Taiwan) has been as limited in scale as has been in India. Greater efforts have been made in China for the development of documentary information resources because it was considered that these resources would work as China's knowledge reserve to promote the development of economy, science, technology and culture. The main effort was made on the rational distribution of the resources with the adoption of new technology. In some countries,
resource sharing has become an important library programme such as in Thailand. In the 1970's work on the creation of bibliographic tools such as union catalogues and union lists of serials had begun but in the 1990s networking was considered to be the main tools for resource sharing. Best examples are MOSTE (Ministry of Science Technology and Environment) library network and CHULALINET (Kaul, 1999).

The growth of library Networks in India can be ascertained to the initiatives taken by NISSAT in establishing CALIBNET in 1986, DELNET in 1988 and other networks subsequently. University Grants Commission (UGC) established national network INFLIBNET in 1988 for academic libraries. No efforts have been made to network public libraries since it is becoming essential to provide networked information to the public. Over the years, the Programme has progressed steadily and since May 1996 it is an independent autonomous Inter-University Centre under UGC to co-ordinate and implement nationwide high-speed data network using state-of-the-art technologies for connecting all the university libraries in the country. INFLIBNET is set out to be a major player in promoting scholarly communication among academicians and researchers in India. More importantly INFLIBNET has been able to create an IT conscious environment in the university libraries. Librarians have now accepted and are eagerly working to bring these changes in their libraries.
There are several other library networks at the city level viz. ADINET for Ahmedabad, BONET for Mumbai, PUNENET Pune, HYLIBNET for Hyderabad, MALIBNET for Madras etc offering services to participating libraries.

5.5 Models

The model integrated university library and information system is likely to have two major components viz. Model Automated system and Model system for information services including consortia model for electronic resources. The required efforts for each of these components are studied in the following paragraphs.

5.51 Model Automated system

A model automated university library and information system for managing information technology in the university library system with a central library and one or more branches is presented.

This model has to be developed with the following few objectives:

1. Automate all functions and maintain a comprehensive automated library system.
2. Campus networking for connecting all the departments with library and Maintain LAN/Campus LAN / and a wide area network.
3. Maintain contracts with two Internet Service Providers and regularly evaluate performance.

4. Seek to conform to all relevant standards.

5. Create all library records in Machine Readable form using standards.

6. Provide online public catalogue access to within & to campus users and provide access to other library catalogues.

7. Provide one or more "electronic access centers" in each library.

8. Maintain a Web site of its Own.

9. Negotiate for online reference services.


11. Provide access to academic information viz. admission procedure, examination system, evaluation, scholarships, etc.

12. Upgrade skills of the staff by training and orientation time to time on implementation of latest IT tools.

13. Designate a full-time system manager.

14. Phase in implementation over a period.
The library system will maintain an automated library system which supports the internal automation of acquisitions with online ordering; serials control with online claiming; cataloging with authority control and bibliographic utility interface; circulation with off-line backup, patron telephone and e-mail notification, and telephone renewal; and patron access catalog etc.

The automation of acquisitions, circulation, catalogue and serials control will make it possible to enter purchase requests in branches and issue them from a central location; and it will make it possible to handle serials check-in in branches while handling claiming and invoice payment at a central location etc. Staff and patrons will have absolutely current status information about that which is on order or has recently been received--and it will be possible for a patron to place a "hold" or "reserve" against on-order or in-process materials. It also will make it possible to determine the latest issue of a periodical, which is available for use.

The cataloging module may also be linked to a bibliographic utility (e.g., OCLC, RLIN, WLN). The database will be complete, including not only the book collection, but also bibliographic records for periodicals and non-print materials.

Circulation should be configured with off-line backup so that the library can continue to charge and discharge library materials when the host or server is
not available. Circulation will also include patron telephone and e-mail notification for overdues and recalls. Telephone renewal can be made available.

An information & referral module also need to be included so that staff and patrons will know which agencies in the community provide what services to whom, and on what terms. The library will emphasize that its reason for automating its internal operations is to improve service to patrons, not to reduce costs.

2. Campus networking for connecting all the departments with library and Maintain LAN/Campus LAN / and a wide area network.

Remote sites need to be connected to the central site for access not only to the automated library system, but also to other electronic sources such as a CD-ROM server, an Internet server, an image server, and possible other servers. Because of the bandwidth needs will constantly be changing, a highly scalable technology is required.

The WAN will incorporate a LAN in each library facility. Each will utilize Category 5 UTP (unshielded twisted pair) cabling. The topology will be Ethernet. Routers will connect the LANs to the central site via the WAN.
3. Maintain contracts with two Internet Service Providers and regularly evaluate performance.

Contracts can be maintained with two Internet Service Providers (ISPs) for staff and patron access to the Internet. The reason for contracting with two ISPs is that it will make it possible to connect no more than half the staff and patrons to any single ISP-something, which is necessary because the service inevitably deteriorates due to the ever-increasing number of users which can outstrip the ISP's capacity.

The library will monitor performance not only by soliciting patron feedback, but also by having public service staff log on during known peak periods of activity. The ISP must offer the library rates, which are lower than those extended to individuals.

Under the circumstances the number of concurrent users of the Internet exceeds 20, the library may install an Internet server. It may mount the software on the same hardware platform as the Web server.

4. Seek to conform to all relevant standards.

Conformity to all relevant standards is a high priority. All cataloging will conform to the Anglo-American Cataloguing Code, Second Edition (AACR-2). The database of the automated library system will be developed and maintained in full-MARC format, including bibliographic, authority, holdings,
and patron records. UNICODE compliance to be sought to facilitate multilingual user interfaces.

5. **Create all library records in Machine Readable form using standards.**

Creation of library database is one of the prerequisites for success of automated systems. Using the relevant standards such as MARC 21 and AACR2 formats the library records are to be created and provide access to library resources. The records so created using the set standards will facilitate easy exchange of records from one library to other library at local, regional, national and international level sharing of resources.

6. **Provide online public catalogue access to within & to campus users and provide access to other library catalogues**

The access to library catalogue and its resources is done through the user friendly online public access catalogue within the campus or to the outside users. This facility ensure that the users gets an access to information such as the holdings of different type of material in the library of their interest and its availability, shows the status of an item, facilitates the reservation etc. The OPAC will also provide access to information relating to due items with due date etc. OPAC user can also see the status of receipt of latest issues of a scholarly journal in the library.
The access to other library catalogue is equally important when the item required by the user is not within the campus or library, he/she may try to access the availability of such items in the nearby libraries where from one can borrow for a limited period using the inter library loan etc. Hence access should also be provided for other library catalogue.

7. Provide one or more "electronic access centers" for patrons in each library.

The electronic access Centres play an important role in the university system as the end users expect the central library to provide such facility even at nominal cost. The library will provide one or more "electronic access centers"-clusters of PCs which provide access to a variety of electronic publications, whether mounted on the local automated library system, local CD-ROM towers, another library's platform, or an online reference service. The resources accessible through such centers will complement the library's print collection, rather than replacing it. While the most widely consulted electronic publications today are indexes and abstracts, an increasing number of reference publications and full-text/image files of journal articles are becoming available.

The Internet, especially that part of it known as the World Wide Web, will be available from all "electronic access centers," but the emphasis will be on identifying the most appropriate sites for patrons, rather than facilitating
aimless "surfing." The users may also be provided e-mail and web-surfing facility through these electronic access centres. Patrons will also be allowed to download to their own diskettes, but not allowed to load their software onto these machines. Instead, separate machines may be provided for word processing, resume writing, tax preparation, and other software applications.

Each electronic access center may be configured to also support multimedia access. Multimedia is a combination of television, personal computing, and optical storage, such as CD-ROM or Laserdisc. An enhanced PC which conforms to the multimedia standards can retrieve not only bibliographic files, but also full-text files, still images, audio, and motion images.

8. **Maintain a Web site of its Own**

Rather than limiting what is available to remote patrons to the patron access catalog, the library will maintain a Web site of its own and links to its automated library system, products on its CD-ROM server. The Web server will be configured with a "proxy server" firewall so that those accessing the libraries' automated library system or other servers will not have direct access, but will interact with the firewall, and it in turn will interact with the target system.
9. **Negotiate for online reference services.**

The library cannot afford to purchase all electronic publications, which may be of interest to its patrons, nor would it want to purchase those not used frequently enough to justify the subscription price. The library, therefore, will continue to augment its CD-ROM collection with access to an online reference service. Among the services, which may be considered are those offered by EBSCO, IAC, OCLC, OVID, UMI, and H. W. Wilson, Elsevier etc. There is increasing price competition; therefore, a competitive procurement will be pursued.

The service is to be quoted for a specific number of concurrent users, with the number to be equal to half the number of "electronic access" devices in the library. Prices will also be required for additional concurrent users. The library will require an option to renew at no increase in rates for a second and third year.

The library will periodically compare the cost of electronic products which are available both from an online reference service and a CD-ROM publisher or distributor in order to be sure that it has chosen the most cost-effective approach to providing information in electronic form.

While an online reference service provides full-text for some titles, many will continue to be supplied from the library's own collection. The identification of
what is available from the library's own holdings is facilitated by the serials control module of the automated library system. All holdings, including the most recent check-in information, will then be available to patrons and staff.

10. **Provide Document Delivery Service including electronic document delivery**

Providing document supply and full-text access to online databases plays significant role in the shift from “ownership” to “access”. The escalating costs of science and technology journals, budgetary constraints, and availability of science and technology literature via non-traditional sources, such as commercial document supply and full-text online databases, are reshaping academic libraries’ science and technology collections, as well as the modes of accessing and delivering scientific information. (Bandyopadhyay, 1999)

ARIEL is a high-speed, high-quality, cost-effective document delivery system that runs on the Internet. Journal articles can be sent from one place to another by scanning the article directly from the journal. Text and graphics are digested into the computer, transmitted over the Internet, and printed on a laser printer at the receiving end. Developed in 1990 by the Research Libraries Group of the Research Libraries Information Network, ARIEL is becoming the document delivery system of choice for a rapidly growing number of users in the USA and abroad. The key advantages which ARIEL has over the fax are: no long-distance phone charges; high image resolution; original source
can be scanned; can send and receive documents at the same time; does not require dedicated equipment; and documents can be stored and forwarded at a later time. ARIEL Version 2.0, released in February 1997 and version 3.1 in 2002, incorporates Multi-purpose Internet Mail Extensions (MIME) technology, which enables documents to be transmitted to the computer screen via e-mail from one individual to another. The university library can provide the document supply using the Ariel software (Landes, 1997).

11. **Provide access to academic information viz. admission procedure, examination system, evaluation, scholarships, etc**

The university library and information system works as model for access to information including the administrative matters etc. The end user should be able to find out the details of the admission procedures in the university system with criteria for selection of students, number of seats in each subject, online application, online results, scholarship details, hostel facilities etc. Though these databases are individually maintained at different places in the university, the integrated system is expected to provide access to such information and updated time to time.
12. Upgrade skills of the staff by training and orientation time to time on implementation of latest IT tools.

Staff must be trained to handle their new responsibilities. As systems become more complex, staff training increases in importance. Training can be limited to small groups to provide both hands-on experience and close monitoring by the trainer. This core group will then train others in the library.

Online reference services also provide training, but it usually is done regionally, rather than on-site at the library. The library will seek to send a group of two to six staff to such training, and will have that group train the others.

CD-ROM products generally come without training; therefore, the library will assign a staff member to become familiar with each product using the manual and hands-on practice. The staff member will then be asked to demonstrate the product to other members of the staff.

Training programs will not generally be offered to patrons, but the library will maintain a roster of local training organizations. The library will provide regular orientation sessions to patrons in the use of the automated library system, the Internet, and CD-ROMs.
13. **Designate a full-time system manager.**

The library will designate a full-time system manager who has responsibility for acting as liaison between the staff and the vendor. Appointment of the system manager ideally occurs before the vendor is selected. The person selected as system manager need not be knowledgeable about electronic data processing but should understand the functions of all of the library's departments and have good interpersonal skills. The system manager will have to reconcile the library's needs with the capabilities of the vendor, coordinate standards development, implement new system features, oversee vendor compliance with the contract, etc.

14. **Phase in implementation over a period.**

The components of the plan can be implemented over a period of time. Reasonable amount of time is required not only for financial reasons, but also because library staff cannot be expected to do everything at once. It also is not practical to develop a plan, which looks further into the future because the rate of change is too rapid.

The plan has to be updated each year and a detailed schedule of activities may be drafted. It will include updated specifications and cost figures.
5.52 Model system for information services including consortia activities.

To provide modern information services with the use of information technology tools, a model system is required which provide services using automated library systems, CD-ROM, online reference services, the Internet, and networks.

Automated Library system

By the end of 1997, over 13,500 commercially developed integrated, multifunction, multi-user automated library systems had been installed in libraries worldwide, primarily in North America, Europe, and Australia. There are considerably number of integrated library management software have been developed by various agencies viz. SOUL by INFLIBNET, LIBSYS, LIBRIS, ALICE for windows, SLIM, TLMS etc. Almost all of these systems support cataloging with authority control, an online cataloging support system interface, circulation, and a patron access catalog. There has been significant development in the automated library systems available commercially. A majority of these also support acquisitions and serials control.

CD-ROM

CD-ROM has become the most popular form of access to electronic publications in the past decade. Advantages of CD-ROM mainly are the speed of replication from a master, low manufacturing cost, and ease of shipping. Its disadvantages are the lack of currency and relatively slow data retrieval time;
however, the drives in the market now are rated at 48x through 52x (48 to 52 times faster than those available in the mid-1980s).

CD-ROM has not displaced the much longer established online database services, although it has changed their use. In the mid-1980s, almost all searching done in libraries was done by librarians accessing databases stored on remote systems such as Dialog; in the mid-1990s, most searching done in libraries was by patrons accessing titles on CD-ROM, and searching for highly current information was done by both librarians and patrons accessing databases stored on remote online database service systems. In the past two years end-user searching by patrons on remote online database services has increased dramatically, primarily because of the availability of the full-text of periodical articles. While the 600 MB per disc capacity of CD-ROM had been an advantage for more than a decade, it became less attractive when electronic re-publishers began to offer collections of full-text periodicals consisting of billions of bytes. Rather than loading multiple CD-ROM discs in a jukebox, libraries began to access these files on the re-publishers' database servers—something that became economical as the result of the Internet.

CD-ROM technology is not disappearing, however, because it continues to become faster and less expensive. Most PCs are now configured with a CD-ROM drive. CD-ROM products sold only to libraries tend to be expensive and the price tends to go up if the product is mounted on a CD-ROM server so that
several users can have access at the same time. Therefore, one must be careful to project usage and divide it into the cost to determine the cost per use.

**Online Reference Services**

The improvement of user interfaces and changes in pricing make it possible for libraries to make available access to online database services by patrons. OCLC's FirstSearch, the fastest growing of the patron-oriented remote database services, increasingly called online reference services, saw the number of searches against its databases increase from a half-million per month in 1994 to several million per month in 1998. Over 10,000 libraries in more than 60 countries use the service. EBSCO, Information Access Corporation, Silver Platter, UMI, and H. W. Wilson, Elsevier Sciences have become major online reference services. Services specializing in science, technology and medicine have also emerged.

Online reference services vary widely in price. Those that offer access to STM publications cost far more than those that offer access to popular periodicals. Most online reference services quote prices based on the number of concurrent users a library wishes to have access the service, but some base their pricing on the number of people a library serves or the size of the library's acquisitions budget. Restrictions are common, including the limiting of access to persons within a library. It can cost considerably more when a library wishes to have
patron access an online reference service from home or office through a library's automated library system or Internet server.

Competitive bidding has become an important aspect of online reference services. Consortia have been particularly successful in obtaining attractive agreements on behalf of their members. As the amount of money spent for access to electronic publications becomes a significant part of library budgets, libraries have begun to develop strategies for optimizing service and cost.

Document Delivery Services

A document delivery service provides hard copies of articles and other publications in response to a submitted request, usually online. In the opinion of many, document delivery is nothing more than providing the copies in lieu of the lending aspect of traditional interlibrary loan. The term "document delivery" was popularized by commercial services offering rapid fulfillment of requests. UnCover, the largest document delivery service, provides an extensive online index to more than 17,000 serial titles and rapid delivery of hard copies by fax or overnight courier service.

Online reference services also offer document delivery, generally by downloading articles "full text" and sending them to a fax machine or a computer with a fax modem that is in image format. A library needs to compile and analyze data on the use of its print periodicals and its interlibrary
loan and document delivery in order to determine the most cost-effective way to access each periodical title. Normally, any periodical of which the current year's issues are used more than five times in the year of publication is cost-effective to own, but if it is used less frequently, it generally is more cost-effective to obtain it from a document delivery service or an online reference service.

Electronic Document Delivery

The electronic document delivery enables a library to request another library for a copy of a document, to be transmitted via network facilities. This involves conversion of paper documents to electronic documents. Scanning and optical character recognition (OCR) technologies, which automatically put materials into electronic format, can help to speedup the conversion process. Apart from this there is an increasing trend to generate the documents in electronic format. This will help the electronic document delivery much easy.

The Internet Services

The Internet is a worldwide network of networks connecting hundreds-of-thousands of computers with a common set of communications protocols. Of these protocols, the most important is TCP/IP, a layered suite which is similar to the Open System Interconnection (OSI) Reference Model which ten years ago was expected to become the standard for connecting heterogeneous computers with one another. Because of its use in the ubiquitous Internet,
TCP/IP has now become the standard for connecting computers within organizations.

There are three major Internet capabilities: electronic mail, remote login (telnet), and file transfer.

Electronic Mail

The most popular service used is electronic mail facility. By enabling the immediate exchange of information with colleagues and participation in online interest groups, electronic mail facilitates formal and informal communication and enhances cooperation and collaboration in research and writing efforts. In addition to electronic correspondence capabilities, network users have access to hundreds of news and interest groups on a host of subjects. Network interest groups offer an outlet for ideas and opinions and serve as a resource for posing questions to others on the Internet.

Remote Login (Telnet)

The Internet telnet protocol allows a network user to access a remote computer and use it interactively as if the local computer were a terminal of the remote host. Telnet requires minimal bandwidth; a 14.4 Kbps modem is sufficient. Telnet provides access to online library catalogs, online reference services, and other online resources; however, the increasing use of graphics on the Internet means that telnet users are at a distinct disadvantage.
File Transfer

The Internet File Transfer Protocol (FTP) allows network users to download files from databases residing at other sites. With any anonymous connection, users gain access to valuable data in "archives" on a wide variety of topics. Supreme Court decisions and opinions, public domain computer software, medical resources, and public polling data are examples of the sort of information that can be obtained via FTP.

World Wide Web

The most significant aspect of the Internet beginning in the mid-1990s was the World Wide Web (WWW). The Web refers both to servers on the Internet and to a body of information—an abstract space of knowledge. The Web has been described as a wide-area hypermedia information retrieval initiative aiming to give unlimited access to a large universe of documents. Web operation relies on hypertext as its means of interacting with commercial users.

Networks

Many libraries have begun to pull together automated library systems, CD-ROM servers, and online reference services so that they can be accessed from a single PC- or Mac-based workstation. The user selects the information source to be accessed from a menu on the opening screen, and is connected to the information source, which may be within or outside the library.
Network based Information Services

The central role of library is to promote and facilitate the effective use of recorded information in all forms by all of its clientele. Networks have potential to improve library services in several ways. The continuous improvement in the networking technologies helps the libraries to reduce the cost of information provision, thus creating new opportunities for the libraries to play their role in information provision to its end users.

The information network must ensure that information can be found or delivered quickly from a large universe. The computer workstations in the libraries are now well equipped for dial-up and Internet access etc. Network facility helps libraries to provide Inter-Library-Loan by sending the Information through E-mail. The online ordering and acquisition related activities can be carried out. Networking with the development of union catalogues of different libraries is acts as boon to avoid duplication of holdings to the extent possible. Reference service can be enhanced with the use of Internet and email facilities. CD-ROM Multimedia service can be effectively provided through Networks. The data communication though networks will be very high and helps users to obtain information within few seconds from anywhere in the world and sitting anywhere. There are several other facilities to improve the services with the use of network based information services to the end users.
Type of Network based Information Services

1. Bibliographic Information Service
2. Full text access to publications
3. Organization of Internet Resources and provide access
4. Provide access to information of Indian Origin
5. Promoting the discussion forums for different subjects
6. Consortia based Services
7. Pattern Service etc

1. Bibliographic Information Service:

Bibliographic services includes - the creation of bibliographic records and the compilation of bibliographies, catalogues, indexes or any other form of bibliographic database. Access to the databases created by the individual libraries and also the union database access provides the bibliographic details of an item held by the libraries. Bibliographic Information Service, provides the patrons with access to databases from a variety of databases. This also includes the access to the database subscribed by the individual libraries in CD-ROM as well as the databases subscribed at the network center.

The network helps the librarians to provide this service in a much better way to maximize the information services of the library and the network as well. Individuals affiliated to networks have access to the databases
developed at national and international level provides access to bibliographical details of the sources available with them. Libraries make effective use of the databases and provide better service to its users.

2. Full text access to publications

The existing collection to many of our libraries is not enough to meet the actual requirements of the academicians and researchers. To supplement the collection and to provide an access to large number of journals, and full text databases available in electronic form at an economical rate. A Network centre can play a major role in providing access to full text of publications to the member libraries.

Full-text resources are the most sought after commodity in an electronic library setting. For students, scholars and the everyday user alike, all they want is what they want, when they want it, where they want it. Full-text electronic resources offer access unrestricted by either location or library hours.

In providing the bibliographic information service and access to full text of journals, number of issues involved as discussed below.
• Identification and selection of databases to be acquired in the network environment.

• Negotiating, pricing, getting access rights from the publishers / vendors

• Financial support for subscribing to these databases

• Licensing and copyright issues.

• Infrastructure facilities to ensure smooth and speedy delivery.

• Required documentation and training to the staff working in the library for providing such service

To tackle all these issues, it is advisable to have a network centre, which can act as facilitator for all the activities mentioned above.

3. Organization of Internet Resources and provide access

Information on the Internet is growing every day. Lot of it is not found useful for academic and research work. Filtering the useful information, organizing it and providing easy access to the same will be a Herculean task. In the network based environment it is possible to venture into initiate the work of organizing the internet resources to buildup virtual library particularly for Indian resources and provide access to end users.

In today’s society, with skill, one can usually find much information on a particular topic. It is the challenge then to sift through this mass to
determine what is reliable and appropriate and what is "junk." Whether the information appears in books, articles, Internet or TV one can't assume reliability. Evaluate all resources read. Users of the Internet were initially impressed that they found useful information of any kind. However, now that anyone with access to a server and a passing knowledge of HTML (Hypertext Markup Language) can put information on the Internet, the problem has become one of sifting through a mass of advertising material and vanity publications in order to find information of high quality. For librarians and library users to make effective use of the Internet, they need criteria to use in evaluating the information found.

4. Providing access to Information of Indian origin

Internet has provided an opportunity for access to ocean of information published on the web. But this data is mostly of data published from other countries. An emphasis on the data relating to Indian origin need to be given and access to such data is to be improved by the way of organizing access to such data of Indian origin. All those individuals and libraries using the network based information services in India agree that, Indian content is very limited. There are various reasons of not many databases are being created though efforts are on to add new databases to the network or available in India made accessible through the Net. In recent years some efforts are being made to create and develop the databases and web / home pages to hook up over the Internet to provide access to data of
Indian origin. There is a need for creation of indigenous databases of various types in different subjects, and areas of importance to users in India. If these databases are once put on the web, rest of the users can access such data. An effort needs to be made to provide access to such data of Indian origin.

5. Promoting the Discussion forum in different subjects

In the networked environment, it is quite possible to create discussion forum in different subjects to help individual to interact with their own group of users working in their area of interest for problem solving and discussion among the users to enhance their skills by participating in the discussion forum. To facilitate exchange of ideas and promote communication among faculty members, students, researchers, scientists, engineers and academicians electronic discussion forum will help to interact each other. This kind of service can be coordinated at national level by the national network agency in the subject concerned.

6. Consortia based services

Libraries in India have been affected by an uncertain financial environment in which resource buying has been restricted, causing them to look at ways of extending their purchasing capabilities to compensate
for reduced budgets. Library consortium is the one of the emerging tool kit for the survival of libraries.

Network is essential partner in this exercise as it facilitates access to vast information services. Networks have potential to improve library services in several ways. The continuous improvement in the networking technology helps libraries to reduce the cost of information provision, thus creating new opportunities for the libraries to play their role in information provision to its end users

Consortium based services is the way of maximizing the resource base in the developing country like India. In the networking environment, it is quite possible to provide the consortia based services with the coordinating agency.

Libraries in India have been affected by an uncertain financial environment in which resource buying has been restricted, causing them to look at ways of extending their purchasing capabilities to compensate for reduced budgets. Library consortium is the one of the emerging tool kit for the survival of libraries. Network is essential partner in this exercise as it facilitates access to vast information services. Networks have potential to improve library services in several ways. The continuous improvement in the networking technology helps libraries to reduce the cost of information
provision, thus creating new opportunities for the libraries to play their role in information provision to its end users.

**Consortia based services helps to**

- Increase the cost benefit per subscription.
- Promote the rational use of funds.
- Ensure the continuous subscription to the periodicals subscribed.
- Guarantee local storage of the information acquired for continuous use by present and future users.
- Develop technical capabilities of the staff in operating and using electronic publication databases.
- Strategic alliance with institutions that have common interest resulting in
  - Reduced information cost
  - Improved Resource Sharing

Consortium based services is the way of maximising the resource base in the developing country like India. In the networking environment, it is possible to provide the consortia based services with the coordinating agency. The above components in respect of automated system and system for information services has been shown in the typology for Integrated University Library and Information System.
Figure – 30
Topology for Integrated University Library and Information System
Model

Library Collection
CD ROM Databases
Co-operative Collection Development
Information Super Highway

ISP

Collection

Access to electronic resources

Academic Services
- Admission Information
- Examination System
- Evaluation
- Scholarships
- Curriculum
- Publications
- etc

Integrated University Library and Information System

Library Homepage/Web services

Network Based Information services
- Access to INFLIBNET
- Organisation of Internet resources
- Bibliographic
- Full text Access
- Discussion Forums
- Consortia based Services
- Access to Indian Content
- Online Reference Service

OPAC/Express Catalog
Electronic Access Centre
- E-mail
- WWW
- FTP/Telnet
- E-Learning

Automated House keeping functions

Training

Campus LAN/Dept LANs
5.6 Topology for Integrated University Library and Information System

The pre-requisites of an integrated university library and information system

The design of an Integrated University Library and Information System has been explained in following subheadings;

1. Input resources

The collection of university library is one of the important components for providing the effective services to its clients. The collection of the library viz. books, thesis, journals, standards, patents, reports, etc will have access through quality check. These items will have an access with the use of bibliographic standards. The second type of collections viz. CD-ROM databases etc. for providing the electronic access to resources. Many library procure the CD-ROM databases to provide the abstracting and indexing services. The third type of collection of the library will be cooperative collection development using the consortia approach or e-subscription. All these collections are likely to pass through the standards adopted by the library. The university library will also like to provide access to information super high way for providing access to other resources but this does not cover under the collection of the library however the library provide access to these resources.
2. **Campus LAN**

In order to provide services through library, university system must have a Campus LAN connecting the departments to the university library. The department gets access to not only the collection of the library but also access to other library resources and electronic access to scholarly resources.

3. **Access to Academic services**

The university library will act as resource centre for academic information viz. admission information, examination system, evaluation, scholarships, curriculum of the different courses, access to publications of the universities. Though the information is updated at individual servers, and work carried out by the university administration, but the access is given from the library website or library.

4. **Automation of Library Housekeeping Operations**

One of the pre-requisite to act as a model, university library needs to automate the library housekeeping operations viz. Acquisition, Circulation, Cataloguing, Serials Control, access to OPAC of the library. The library functions are automated using the integrated software, which can take care of all the functions relating to housekeeping operations of the library.
5. **Electronic Access Centres**

The model university library system is likely to provide the electronic access centres in the university library to act as information kiosks. These centres are also likely to provide email facility, Internet surfing etc.

6. **Out put - Services**

An Integrated University Library and Information System with the inputs discussed above will provide integrated solution to the requirements of the users. The OPAC access / Express catalogue will provide access to not only the collection of the library etc, but also link to the status of collections, library profile, announcements etc. Document delivery including electronic document delivery will be provided by library.

In the networked environment the university library and information system will provide network based information services viz. Bibliographic, full text access to resources, organized internet resources, establish discussion forums, access to resources through consortia etc. The library will maintain its web page and provide web services.

In the networked environment, the integrated university library and information system will take care all the functions to provide the one system, one library concept, thus providing one stop solution to the user requirements.
5.7 Conclusion

An effort has been made in this study to identify the pre-requisites for an university library system to work as an Integrated University Library and Information System capable of providing one point solution to the end users. The Government or corporate sector must take lead in developing such a system and provide comprehensive solution to the existing situation.

Many efforts made by different countries to develop an Integrated library system which are discussed in the review chapter shows that, most of them have designed the system with a specific purpose of providing integrated solutions to the requirements of their proposed users. However it is found that these systems are not comprehensive as expected and they are of commercial nature providing solution to limited area of university system. NOTIS-Northwestern Online Totally Integrated System (1982), Georgetown University's Library Information System (1983), DOBIS/LIBIS on-line library automation system (1984), Tamkang Automated Library Integrated System (TALIS) (1988), LIBERTAS integrated library system (1990), The Slovak National Library Integrated Library and Information System (1992), GRIBSINFO integrated information system, Voyager integrated library system, California (1993), CROLIST integrated library system (1994), PALS integrated library system (1995), Agricultural Library Network of Sri Lanka (AGRINET) has developed an integrated information system (1997), SIRS
Mandarin is a fully integrated library system (1998), Horizon integrated library system (1999), Columbia Library System etc are some of the examples of Integrated Library System. The Technology Resource Foundation has announced OpenBook(2001), a free, Web-based integrated library system that offers flexible, sophisticated automation to small to mid-sized public or school libraries are some those.

Libraries have always been concerned with public service and access to collections. Traditionally, service and access have been provided on an as-needed basis to those people who actually enter the library building - This approach allowed librarians to help those who had a specific and defined need for information and defined the library as the place to go for help. Networking technology has had very real implications for information services and "Academic institutions and their libraries were early beneficiaries of national electronic networking initiatives" (McClure et al., 1993). With the advent of library systems, library collections became more accessible within the library and outside the library. Libraries made the transition from the card catalog to the online catalog, allowing electronic access to the information and making keyword searching a real possibility, a real boon to novice library users. Telnet and gopher access to libraries were the first popular manifestations of information-sharing and communication technologies, allowing remote access to collections and predicting the global information networks available today. Thus an integrated university library and information system serves the one-point solution to the end users.
5.8 References


